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DISNEY EXCLUSIVE BIG HERO 6

- Adapting Marvel for computer animation
- The studio's next-gen software revealed
- Record-breaking render times



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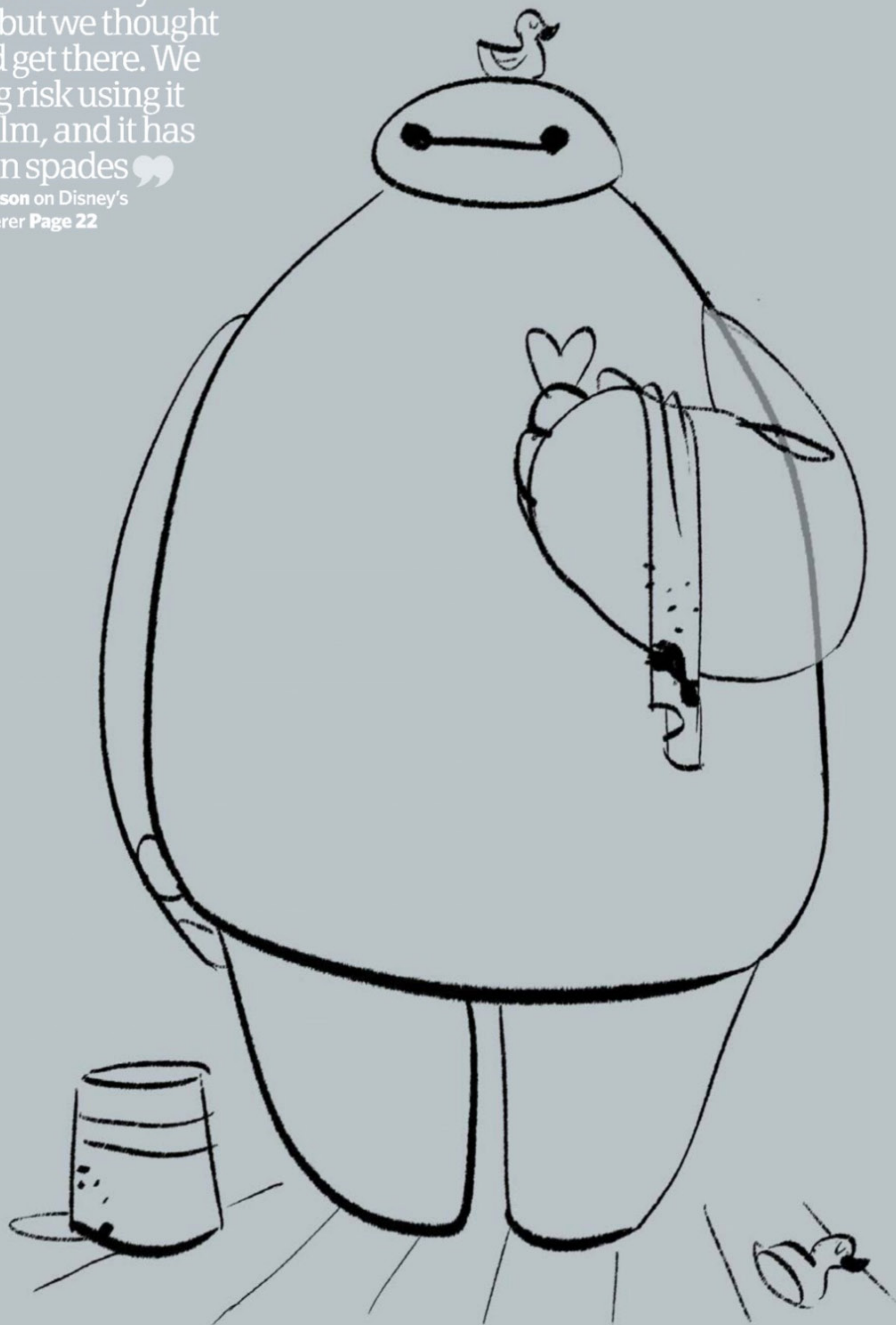
Disney exclusive:
BIG HERO 6



Following on from the hit animated feature, Frozen, Disney talks to us about its next big project, Big Hero 6. Turn to page 22 to learn about the in-house software developments that the company made, from simulating realistic lighting, to creating diverse and totally unique crowds.

“We still didn’t have the renderer totally written, but we thought that we’d get there. We took a big risk using it for this film, and it has paid off in spades”

Andy Hendrickson on Disney’s Hyperion renderer **Page 22**





50 expert tips in
MODO. Page 30

Welcome

to the magazine and 100 pages of amazing 3D



Welcome to 3D Artist magazine! With *Frozen* officially becoming the highest-grossing animation in history this year, we couldn't resist catching up with the artists at Disney to talk more about its successor, *Big Hero 6*. Discover how the team developed a whole new set of in-house tools for the feature on p22. Elsewhere, enhance your arch-vis skills with a tutorial on how to rebuild the Taj Mahal in 3D (p50), or learn 50 MODO tricks and techniques from industry experts (p30). Enjoy!

Dan Hutchinson Editor in Chief

Every issue you can count on...

- 1 Exclusively commissioned art
- 2 Behind-the-scenes guides to images and fantastic artwork
- 3 Digital downloads full of handy assets
- 4 Interviews with inspirational artists
- 5 Tips for studying 3D or getting work in the industry
- 6 The chance to see your art in the mag!

This issue's team of expert artists...

Orestis Bastounis



Our knowledgeable tech expert Orestis puts four of the biggest workstation brands to the test on p80 and reveals his opinions on the new Boston Venom 2302-7T

Lorenzo Zitta



Freelance artist Lorenzo Zitta explores how to merge 3D imagery with photography in his quirky LightWave characters tutorial over on p60

Leticia Reinaldo



The very talented Leticia Reinaldo explains to us the benefits of polypainting while sculpting. To read her tutorial on how to implement this in your pipeline, turn to p76

Ng Jian Han



Learn how to create an amazing tiger mech character with Jian Han's Maya quadruped tutorial over on p40. Share your re-creations with us at www.3dartistonline.com

Gustavo Åhlén



In the very last part of his human anatomy masterclass, Gustavo takes us through the process of sculpting the leg muscles in ZBrush. Check it out on p70

Rainer Duda



What do you think about The Houdini Engine for Maya? Discover what our Houdini expert Rainer Duda made of it on p86. Let us know what you think of it on our Facebook page!

Sérgio Merêces



See exactly what it takes to rebuild a realistic, 3D, iconic landmark with arch-vis expert Sérgio's handy step-by-step tutorial on re-creating the Taj Mahal on p50

Chris McFall



Chris reveals his workflow for animating a liquid-metal logo in After Effects. Check out the tutorial on p74 and head over to our digital downloads for a handy video guide

Ellen Wolfe



Producer Roy Conli and chief technology officer Andy Hendrickson take time out of their schedules to talk to Ellen about how Disney created *Big Hero 6* on p22

3D Artist

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Image - Lorenzo Zitta

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Italian digital artist Lorenzo Zitta knows how to create thought provoking still images with LightWave 11.6. Whether the still is computer-generated with LightWave, an artful arrangement of digital photos, or a combination of the two, the composition of the scene – with its attention to detail and unusual merging of objects – demands a closer look.

"Thanks to LightWave, I can quickly test many different approaches for my projects. I love bringing models into Layout and switching on Radiosity, then start working on shading and lighting, bringing in more elements, and testing and improvising to get the look I want." - Lorenzo Zitta

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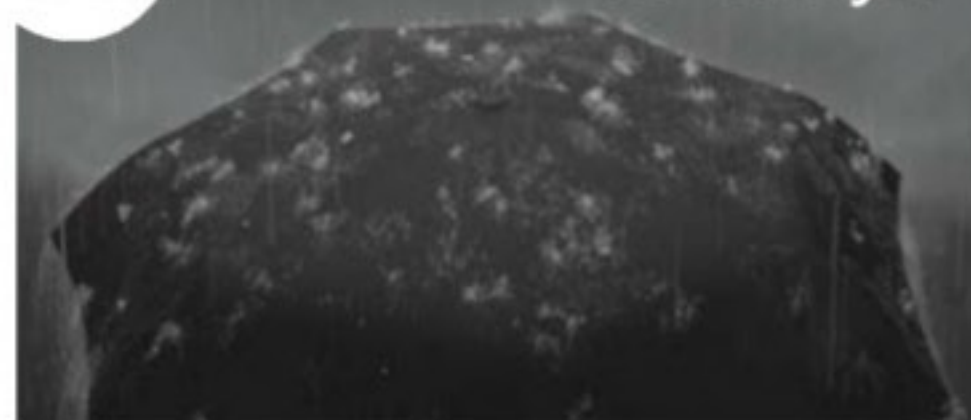
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Houdini Engine
for Maya



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50 expert MODO tips

“One of the coolest features in 801 is the ability to set a default scene”

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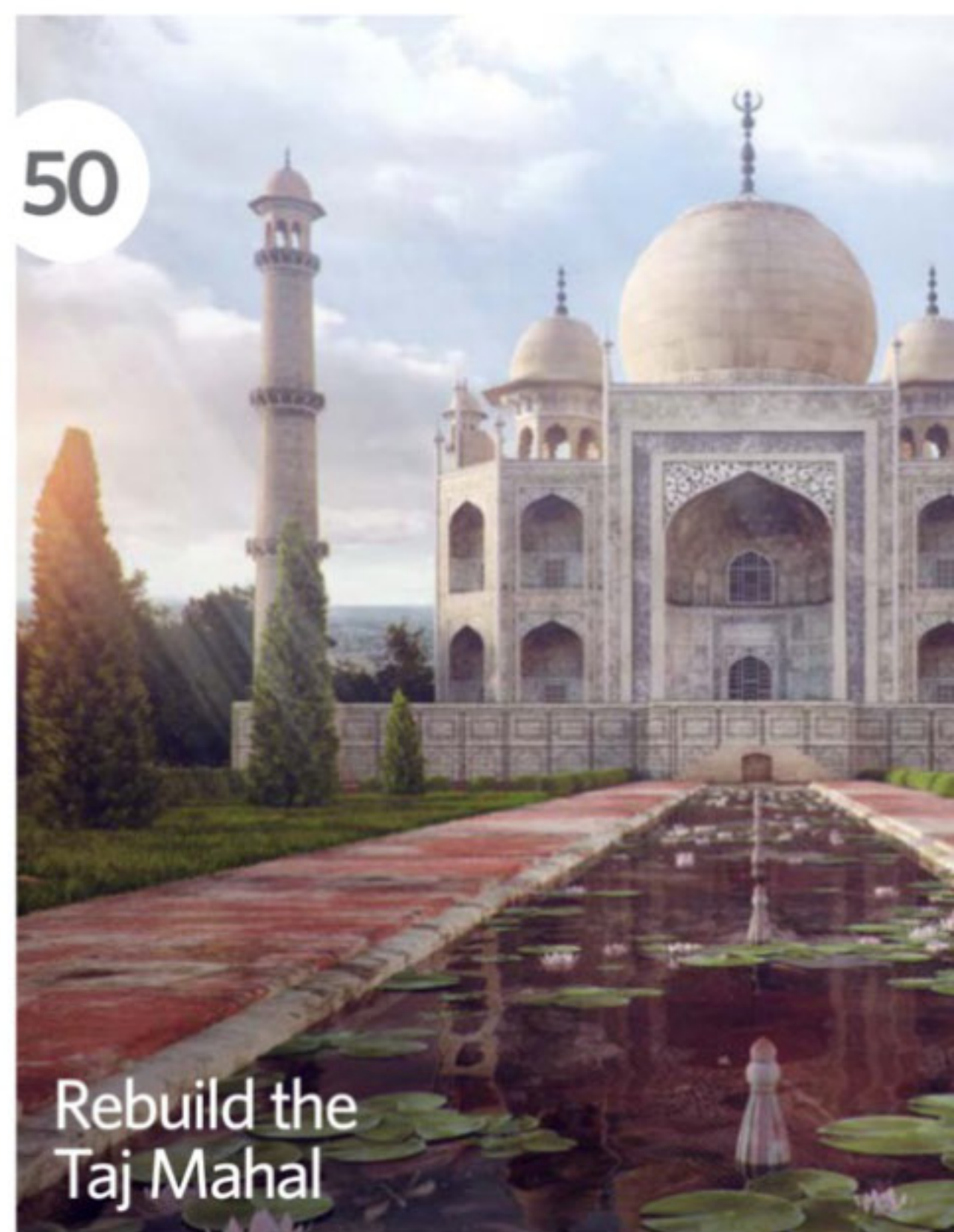
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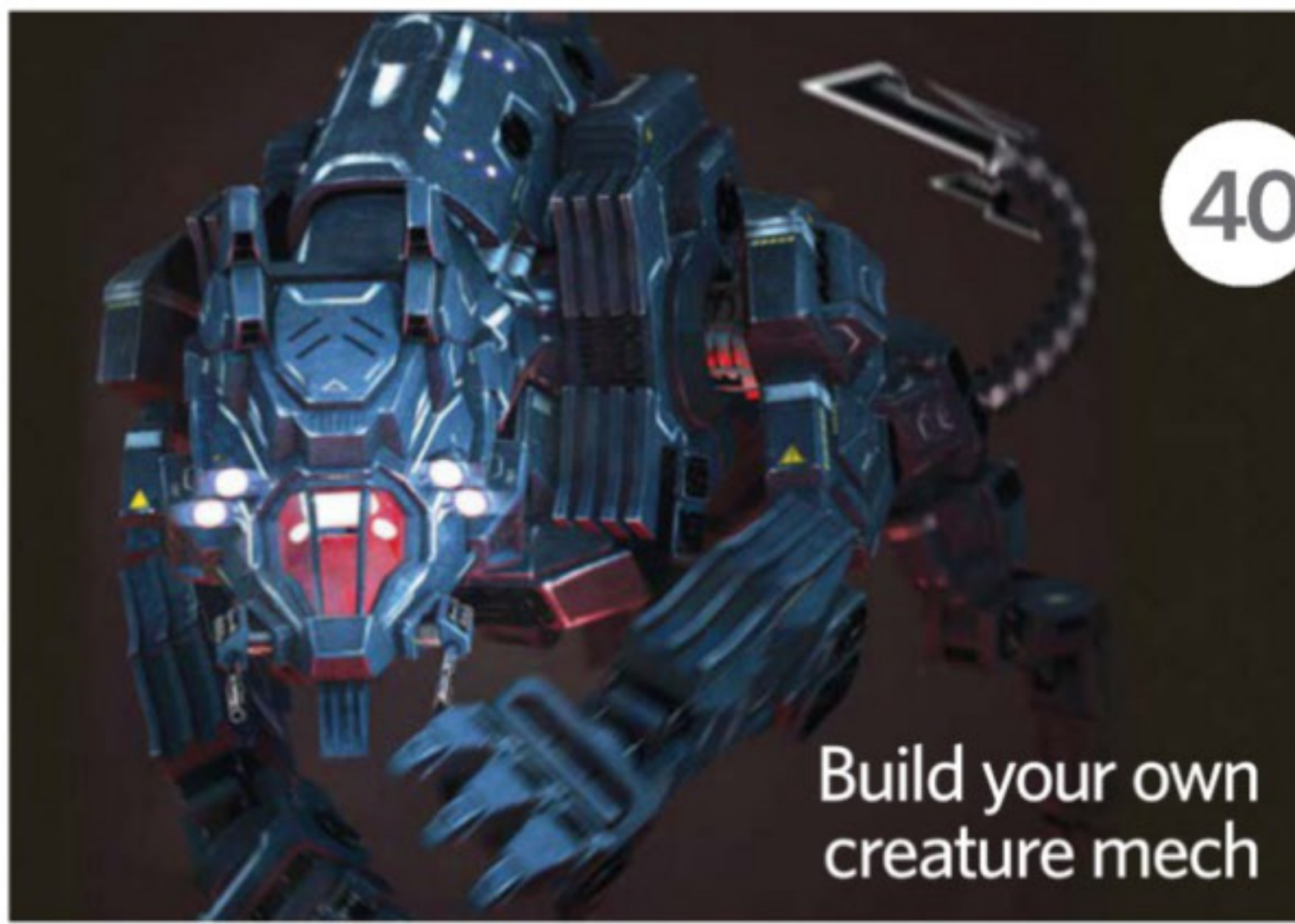
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“Thousands of people populate the scenes in this movie, and no two are alike”

Andy Hendrickson, Chief technology officer, Disney Page 22



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The Gallery

Have an image you feel passionate about? Get your artwork featured in these pages
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“ This work was inspired by this year’s World Cup. When I watch the game, I usually find the football fans are very excited – even more excited than the players. This gave me the idea to express an exaggerated version of what I see in an interesting piece of art ”

Zheng Shi, *Crazy Fans*, 2014



Zheng Shi

After studying CG at university, Zheng Shi now works with 3D animation and film production

Personal portfolio site

www.zhengshi.cgsociety.org

Country China

Software used Maya, 3ds Max, ZBrush, Photoshop, V-Ray

Work in progress...



The Gallery



Taehoon Oh

As a lead artist on the COD franchise, Taehoon is now co-founder of Reload Studios

Personal portfolio

www.taehoonoh.com

Country USA

Software Maya, KeyShot, Photoshop

Work in progress...



“I’ve always been eager to create a sci-fi robot for my personal portfolio. I got inspired by the mech designs from both *District 9* and *Elysium*”

Taehoon Oh, MEK-05, Sci-fi Robot Bust, 2014



Vid Beníšek

Vid works at RC Anima, Animation and Post Production studio in Zagreb

Personal portfolio

www.vidbenisek.com

Country Croatia

Software 3ds Max, V-Ray, Magic Bullet Looks, Photoshop, Marvelous Designer

Work in progress...



“ Objects like coffee cups, photos, books, magazines and sticky notes tell a lot about someone’s personality. In this scene, I imagined the space of someone who lost track of time ”

Vid Beníšek, *Workstation*, 2013





Alessandro Bandinelli

Alessandro works on a tax-free film in Parma, getting inspiration through his love for film

Personal portfolio

www.facebook.com/pages/Banduz-3D-artist/480190561995376

Country Brazil

Software ZBrush, 3ds Max, Hair Farm, V-Ray, After Effects, Photoshop

Work in progress...



“ I’ve always loved the saxophone and I tried to re-create the feeling of a musician performing in public. I started this project as an exercise in sculpture, but I decided to use it to study V-Ray ”

Alessandro Bandinelli, *Saxman Portrait*, 2014



Paul Braddock

Paul works at Animal Logic in Sydney, working on VFX films and feature animations

Personal portfolio

www.paul-braddock.com

Country Australia

Software ZBrush

Work in progress...



“ This character is typical of the free-form modelling that I enjoy, where you just jump in with no idea what the outcome will be ”

Paul Braddock, *Flippers & Fins*, 2014



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Winston – an adopted Boston terrier – starts to run into problems when his previously single owner who cooked delicious food falls in love with a woman obsessed with healthy eating



Short of the year?

First-time director Patrick Osborne tells us more about the making of 'Feast', Disney's incredible new successor to 'Paperman'

It all started with a simple sketchbook. "I have always kept sketchbooks, ever since I was a kid," says Patrick Osborne, director of the upcoming new Disney short that will be revealed in cinemas before *Big Hero 6*.

"You just put down an idea that seems interesting and then you look at it a couple of months later, and it's usually bad. However, every once in a while you write down something where you see it and you connect to it again, almost like someone else is pitching you the idea."

One such idea – a sketchbook scribble that has changed Osborne's career for the past year – was to illustrate a person's life using just the food they ate. He even tried it himself, creating a six-minute film of all the dinners he had throughout a year with the 1secondeveryday app. "It was after watching that when I thought, there's something really cool here, that if you add a character to it, you could make a really nice short," Osborne explains. Luckily, it was at this time that Disney decided to formalise its short pitch program, so that anyone at the studio could

stand in front of its directors and share their ideas. For Osborne, who was head of animation on *Big Hero 6* at the time, it was an opportunity too great to resist.

"I was supposed to pitch to John Lasseter the following week, but he was still busy with *Frozen* so we eventually got delayed to four months later," Osborne reveals. He tells us that the setback actually proved to be invaluable in giving him the time to pitch to other directors and get their feedback, so that by the time he got to Lasseter himself, he was more than ready.

"You had to pitch three things and that was one of them," he continues. "The story of a family through the food on their table, all from the point of view of the family's dog from when he was a puppy.

When I got to pitch to John, it got green-lit, and we went straight to the story!"

Osborne gave up his role on *Big Hero 6* and, along with a team of six permanent artists, spent the next five months developing the storyline of the idea. "We then did 16 weeks of actual production and one month of post, sound and score, stuff

like that," Osborne remembers. "It was an amazing first-time experience of directing – it was really neat to see all sides of the filmmaking process." The ultimate result was 'Feast', a six-minute short about one man's love life as seen through the shifts in the meals he shares with his best friend and dog, Winston.

“It was an amazing first-time experience of directing – it was really neat to see all sides of the filmmaking process”

Patrick Osborne, director of 'Feast'



"We used ZBrush for modelling – pretty much all modelling is done in ZBrush at Disney," he continues. "Then we used Harmony for all the 2D stuff, Maya to animate in 3D and The Foundry's NUKE. Renders were a few minutes, but the comps were long." The 'Feast' team also made use of Disney's range of custom Maya tools as well as Meander – the same in-house application that was used on the 'Paperman' short – to enable 2D, hand-drawn artwork to stick to a dimensional CG-animated layer underneath for a blended result. With incredible functions, such as the ability for an animator to simply draw on a few frames before Meander can automatically generate in-betweens, it was an essential piece of software for the 'Feast' team.

It's also one that Osborne himself is on the patent for having helped develop in the first place. "We just added a few little extra things that we wanted for 'Feast'," he explains. "The main thing was that we aimed to use the 'Paperman' theme again, but we were going to do no line on the outside of the character and just let the contrast tell you where the character is." Instead of the clean contours Disney characters would classically have, the lines on 'Feast' were also more about celebrating imperfection.

"We had this cool ripped-paper-edge technique that I talked about at SIGGRAPH where we made all the edges a little like uncontrollable rips to get that slight human touch to them," Osborne tells. "You have to be careful with that though, because you don't want it to look like it's moving through a glass window, so there were a few techniques developed using our new renderer, Hyperion, to get that look right."

So, what began as a quick, beautiful idea in a sketchbook is now on the verge of being watched by millions in cinemas all over the world. "It's just been amazing to show it to people after having had it as a secret for so long," Osborne concludes, still surprisingly humble. "As soon as you get green-lit, it's actually a very scary moment. You realise lots of people are going to see your idea and you have to live up to this legacy where Disney's made hundreds of shorts and yours is sitting among those. It's a scary thing!"



TOP The idea centred around the fact that people have different kinds of meals at different stages in their lives, from being single, to the extravagant dinners of dating

BOTTOM "The thing about shorts is that they're about new talent. I'd never take that opportunity from the next to make one," tells Osborne when asked whether he would push to direct the next short



The BFX competition involves teams of four to six students or graduates creating a full 15- to 30-second sequence over just seven weeks at Bournemouth University. The festival takes place in Bournemouth from the 24 to 28 September



The art of mentorship

This year's BFX industry mentors tell us what it's like guiding students' work and give their advice on the best ways to find constructive feedback

Dan Moore www.themill.com, www.danmoore3d.com

Modelling & texturing supervisor at The Mill, London

"I think mentoring, in some form, is invaluable. Finding a mentor can be tricky. Networking is key. Taking part in competitions like BFX allows direct contact with industry professionals, but it is also possible to get this feedback on forums. If artists keep posting their work, they will invite comment. We all look and post on forums regularly, so the advice is out there."

Arnfinn Moseng www.blue-zoo.co.uk

Animation director at Blue-Zoo

"Blue-Zoo was founded by three former Bournemouth University graduates, so we have always had a close relationship with this course. I'm very passionate about the animation industry and love working with students, so when I was asked if I would be a mentor for the BFX I immediately said yes."

"The most important thing to realise when thinking of being mentored is to be open-minded to other people's input. Take on board feedback even though it can be tough getting negative comments on something personal you have worked very hard on. It's important to find someone who gives constructive feedback as well, though. If your mentor only brings you down, you should look somewhere else."

Jerry Hibbert www.hibbertalph.com

Animation director

"It's not the first time I've mentored and I would happily do it again. I think one of the challenges was that as an animation director, I'm used to people just doing what I say. These teams didn't always, which was a frustration after a two-hour drive down from London. To be fair, though, they were sometimes getting conflicting advice – there's never one way to solve a problem – so they weren't obliged to follow orders. I think as mentors we were sometimes

surprised at how inexperienced they were – but that's a consequence of working with experienced people for many years. We were all inexperienced once!"

Simon P. Jones www.moving-picture.com

Head of lighting at MPC, London

"I started doing CG around the age of 15 as a hobby, and after reading lots of online forums and quite a few late nights at the computer, I managed to get a few shots together to make a demo reel. [Feeling] quite proud of myself, I sent it out to all the major studios and heard nothing back. I had to rinse and repeat that process about five times until I got my first studio gig and the rest is history! I'm currently working at MPC as the head of lighting for the London office."

"Most of the things I learned in my career were taught to me by other professionals – sometimes online via forums, sometimes via my coworkers, or sometimes via really awesome SIGGRAPH papers that someone wrote a few years ago that I now get to read and benefit from. I remember when I was starting out in CG, I wrote an email to John Gross, who was one of the co-founders of Eden FX, asking for advice about getting into the business. He wrote back with some great advice and it helped push me further in my ambitions to become a VFX artist. For me, it's about giving a little of that back to the industry and the people that helped get me to where I am today."

"The students in this competition have been really amazing," exclaims Jones. "We have everything from a stop-motion astronaut to fully CG pirates to a mix of VFX and live action!"



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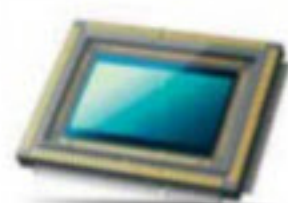
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Images of the month

These are the illustrations that have been awarded 'Image of the week' on 3DArtistOnline.com in the last month

A European Rhinoceros Beetle

» Jonathan Vårdstedt

3DA username JonathanV

Jonathan says: "I've always wanted to make something organic, so I created a European rhinoceros beetle, since I was fascinated by the look of it. I'm very happy with the final image."

We say: Achieving photorealism is the ultimate aim for many 3D artists, and Jonathan has really hit the nail on the head in this image. From the intense detailing on the beetle's shell, to the beautifully diffused background, this is an incredible study in photorealism.

B The Burglar

» Mattias Edström

3DA username edstrom

Mattias says: "This piece was actually a study of Pedro Conti's work, *Pirate* - another larger-than-life character portrait. I've tried to match the same level of detail and personality in my image."

We say: With its subtle lighting and almost caricature-style pose, this image has a real Pixar vibe to it, and the level of detail is equal to that of its inspiration. With his jutting jaw and flattened nose, Mattias's character really exudes an air of thuggish brutality. Good work!

C Scout Unit 1

» Davide Di Giannantonio

3DA username lordsme

Davide says: "This was a work-in-progress piece of a bio-tech scouting unit. It features AR focus assistant on a contact lens, infrared lighting system and an electrostatic cleaning eye."

We say: We love the human quality embedded into this image of a flying robot. This element really adds an eerie ambience to the image.

D Firestorm

» Eugene Gittsigrat

3DA username gittsigrat

Eugene says: "This is my latest personal project. The aim was to create something photorealistic, which had its own unique atmosphere to it. It was created with ZBrush, MARI, Maya, Arnold and NUKE."

We say: The sculpting and rendering is absolutely top notch, and the choice of camera angle creates so much empathy for the poor creature. With those terrifically sharp horns, however, we don't want to be around when he gets loose!

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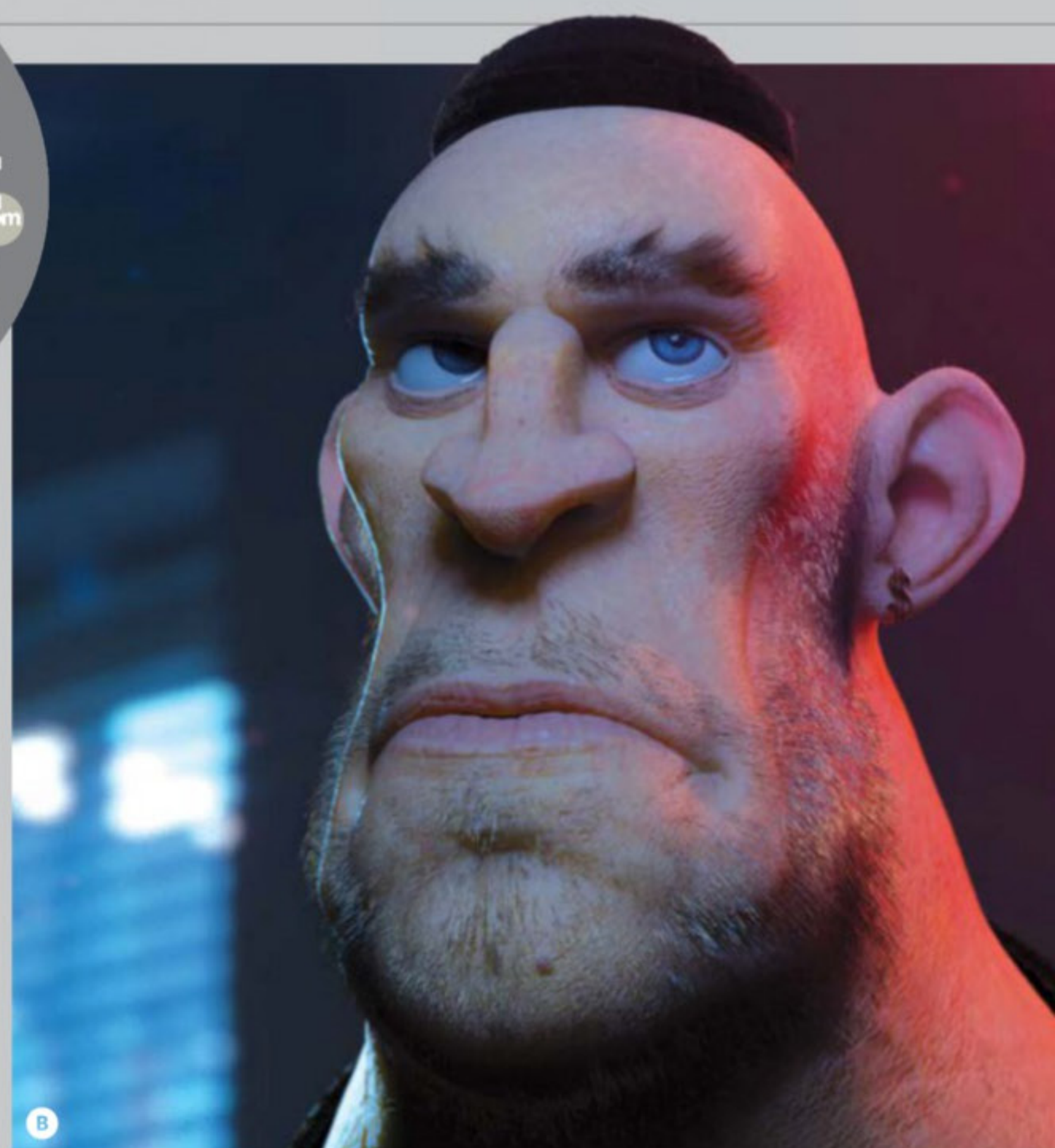


Image of the month



Le Soldat De Marathon

» **Morten Jæger**

3DA username MjTheHunter

Morten says: "An anatomy study of Jean-Pierre Cortot's *Marathon*. It's one of my favourite sculptures of all time, so I wanted to replicate it in 3D."

We say: With such intricate details and a dedicated commitment to the original, Morten has seamlessly replicated the real-life work of art.



Liquid Exhibition

» **Martin Siegner**

3DA username MartinS

Martin says: "I've always found it quite challenging to generate any sort of realistic fully 3D water, so I decided to give it a try. This image is some kind of a mixture of my results, combined with a personal arch-vis project."

We say: The way that the light bounces off the waves really convinces the eye of the water's realism. Anyone for a quick dip?



Slug

» **Kévin Demuynck**

3DA username Kevin Demuynck

Kévin says: "I made this design with ZBrush, KeyShot and Photoshop. The swamp slug is a wild creature that swallows and digests her victims slowly."

We say: Look at the icky detail to the slime! The composition here perfectly captures a unique, horrifying monster.



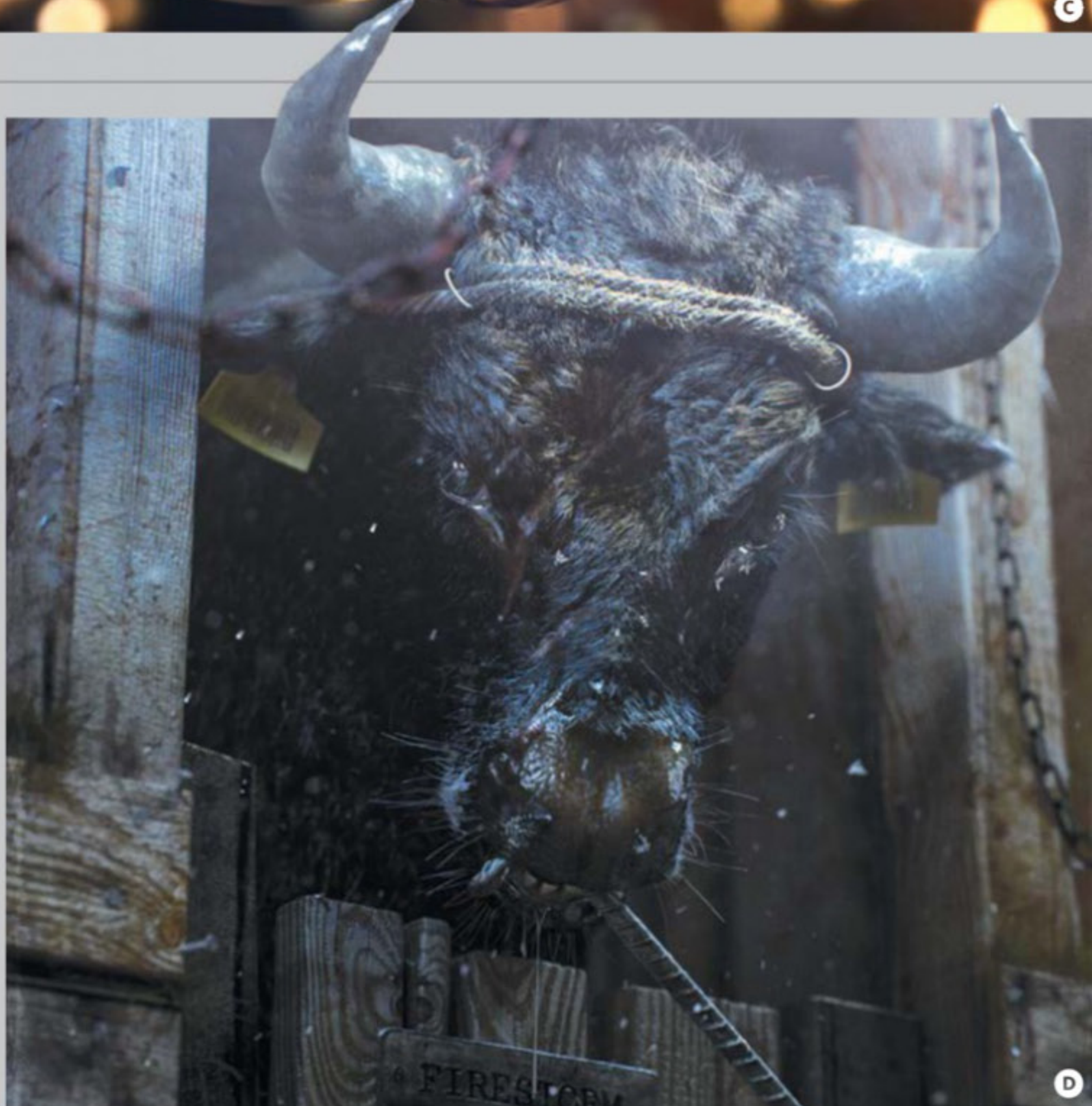
Thirst

» **Andrew Krivulya**

3DA username artofcharly

Andrew says: "This work was created back in 2009. Back then, I had just mastered Autodesk's Maya and 3ds Max. I then repeatedly returned to it and spent time completing it over 2012-2013."

We say: Check out the condensation on the glass - it's a small, but incredibly effective detail, and we're dying for a sip.



DISNEY
EXCLUSIVE



BIG HERO

6

INSIDE DISNEY ANIMATION

Producer Roy Conli and
chief technology officer
Andy Hendrickson unveil
Disney's breakthroughs
in action animation



*"We still didn't have the renderer
totally written, but we thought
that we'd get there. We took a
big risk using it for this film, and
it has paid off in spades"*

Andy Hendrickson, chief technology officer



When the Walt Disney Company acquired the Marvel brand for \$4 billion in 2009, the stage was set for an action picture that paired breakthrough computer animation techniques with inventive comic book characters. With *Frozen* officially crowned the highest-grossing animated feature of all time earlier this year, the studio is finally releasing a successor that will fulfil that potential: *Big Hero 6*.

"We're all big Marvel fans," says *Big Hero 6* producer Roy Conli, a 21-year Disney veteran who also produced the computer-animated hit *Tangled*.

"This is a superhero film with a lot of heart, action and comedy," he summarises.

Inspired by a comic-book team of heroes that made their debut in 1998 with *Sunfire* and *Big Hero 6* #1, the film will tell of the adventures of a clever teen and a cadre of robots in San Fransokyo – a city that blends elements of San Francisco and Tokyo. "Just like that mash-up," Conli continues, "I think the mash-up of Disney and Marvel will be fun."

Big Hero 6 certainly boasts a very colourful cast, featuring an inflatable, huggable robot named Baymax and cohorts that include Go Go Tomago,

Wasabi, Honey Lemon and fanboy Fred. Led by the robotics prodigy Hiro Hamada, these high-tech heroes breathe fire, shoot plasma weapons and track down an enemy that's targeting the city of San Fransokyo.

As well as being the first time audiences will see what Disney can really do with Marvel's characters, however, *Big Hero 6* also represents another major turning point. It will be the first feature for which Disney used its proprietary, high-powered renderer Hyperion, making it the most technically advanced film the studio has ever made.



"To make him look like he's made out of vinyl, light rays have to bounce around inside him many, many times. Otherwise, he looks like hard plastic. Without the light simulation capabilities inside Hyperion, I'm not sure how we would have done that," says Andy Hendrickson

STUDIO PROFILE

Walt Disney Animation Studios

Location Burbank, California, USA

Bio Since embracing computer animation with 2005's *Chicken Little* and 2007's *Meet The Robinsons*, Disney's digital expertise has continued to grow. The legendary home of hand-animated characters Mickey Mouse, Snow White and Cinderella has become a force in 3D animation under the guidance of CG pioneers John Lasseter and Ed Catmull.

SHEDDING LIGHT ON HYPERION

"We're always trying to put amazing, inspiring images on the screen," states Disney's chief technology officer Andy Hendrickson. "For *Big Hero 6*, we wondered 'how can we make it easier to do, and actually make a big visual impact'. We thought about how we could do global illumination on a scale that had never been done before."

Hendrickson, who previously oversaw technology at Industrial Light and Magic and PDI/Dreamworks, had worked on films as diverse as *Forrest Gump*, *A.I* and *Shrek 2* before joining Disney Animation eight years ago. Among his responsibilities as the studio's CTO during the past two years, he has overseen the development of Hyperion and its use on *Big Hero 6*. "We started by looking at the physics of light and energy conservation, which is part of how global illumination works," he explains. "We looked at the base physics of light interaction and energy transport, and decided to build a renderer that was physically motivated."

While global illumination techniques have been used in CG features before, notably those from Blue Sky Studios and Pixar's *Monsters University*, Hendrickson notes, "We built Hyperion to take advantage of modern computer architectures with multi-core machines. We didn't have to try and

modify software that was built for older computer architectures."

The Hyperion renderer was developed in a couple of stages, Hendrickson explains. "We performed some experiments and started making some pretty cool-looking images. Then last year, we thought 'let's go all in - these experiments look favourable enough'. We still didn't have the renderer totally written, but we thought that we'd get there. We took a big risk using it for this film, and it has paid off in spades."

Interestingly, until *Big Hero 6*, the studio had used Pixar's RenderMan software, originally the brainchild of Disney Animation president Ed Catmull. "We kept Ed abreast of what we were doing," recalls Hendrickson, whose former employer, ILM, happens to now be a sister company of both Disney and Pixar. Hendrickson continues, "We're sharing Hyperion freely with RenderMan and ILM. What's fascinating is that Pixar, Disney and Lucasfilm/ILM operate as separate entities, but we share so much. Every couple of weeks we're on phone calls talking about the techniques we're using. Not everybody moves in lockstep, but we share back and forth. We even share source code."

THE FUTURE OF DISNEY ANIMATION?

It's a truism of computer animation that as computing power increases, things don't necessarily get faster or cheaper, because artists want to wield that power to accomplish more. Conli can attest to that personally. "Back in the days when we were introducing massive amounts of information into animation, the 'sell' was always that it would save money - but what it does is it increases the art. It gives us a greater ability to create something unique."

When the Hyperion renderer was introduced to the production team of *Big Hero 6*, Conli witnessed a revealing phenomenon. "Because a ray-based system performs a much more realistic simulation right off the bat, artists have a much more predictable outcome in terms of what their first pass is. There's less data management for artists - the result is that, rather than fewer iterations, it permits more iterations."

Conli states, "The nice thing about Hyperion is that we can do low-resolution renders and get a pretty good idea of what something will ultimately look like. When we started approving lighting, we started off with rough, 1k looks, just to ensure that we were on the right track."

Hendrickson notes, "Rather than spend a lot of time trying to get something to look at least plausible, it was plausible out of the box. This approach allowed us to work at a lower, noisier resolution. With global illumination, noise is the thing you bake out over time. As you up the number of rays that you put into a scene, that gets rid of a lot of noise. With Hyperion, the translation between what we considered our working resolution to the final image was so understandable [that] we could do art approval with the noisy lower-res image. When we waited for the system to bake out the final high-res frames, it looked very, very close."

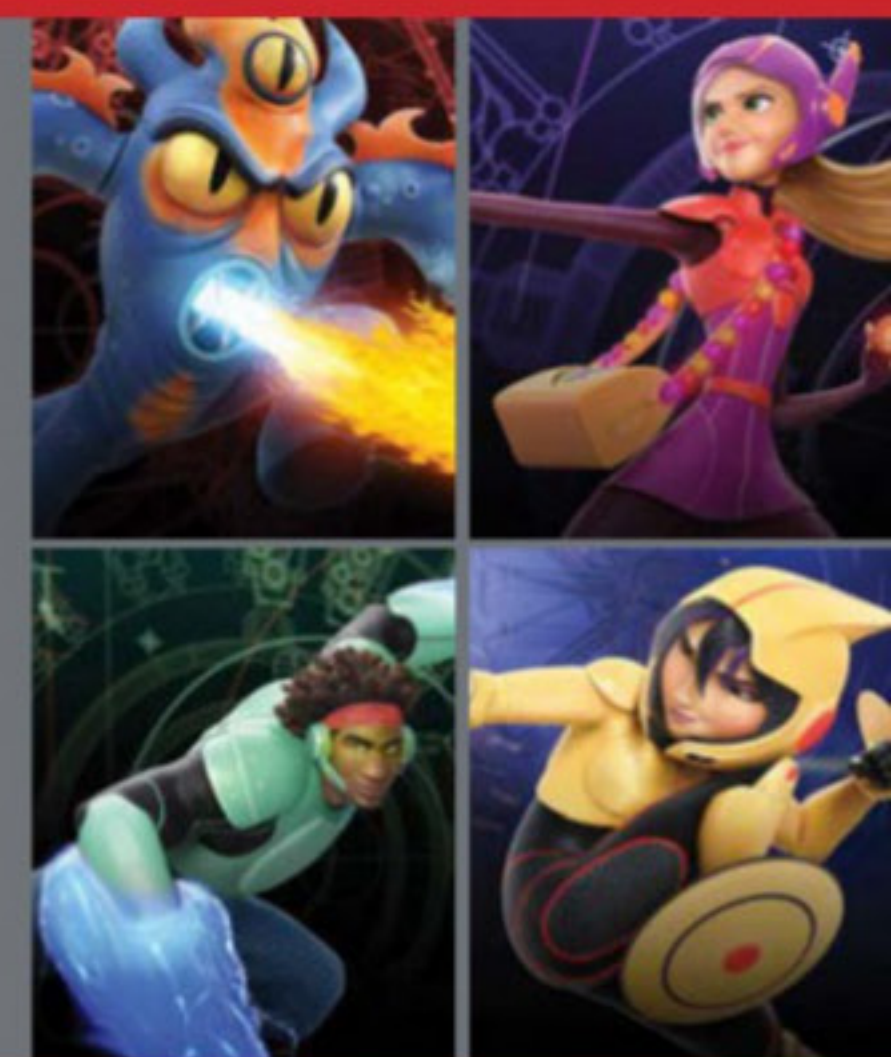
The system impacted the colour-correction process as well, adds Hendrickson. "We usually have to wait for the final images to be made and then colour correct them. We could actually colour correct the low-res assets, keep those corrections, and when the higher-res assets were finished, we could apply those colour corrections to the higher-res assets. That allowed us to take what used to be a serial process and parallelise it. We could have a post window that was very different than it was before."



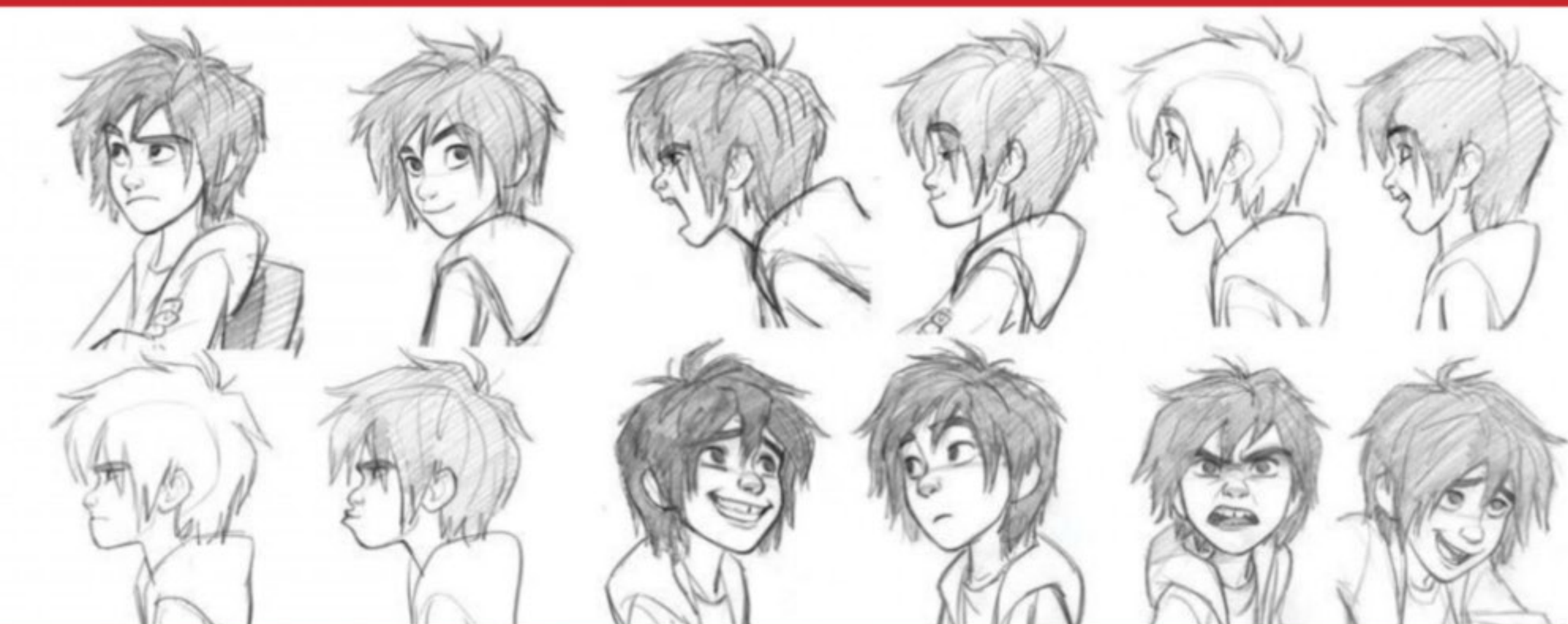
THE HYPERION LOOK

"There's a stylisation to this world that makes it fantastic, and that's what you really want," says Disney CTO Andy Hendrickson. "The shots of Hiro flying above the city with Baymax are fantastic in stereo - you're really there. Those shots weren't created just so we could show off in 3D. It's a huge story point that just happens to look fantastic in 3D!"

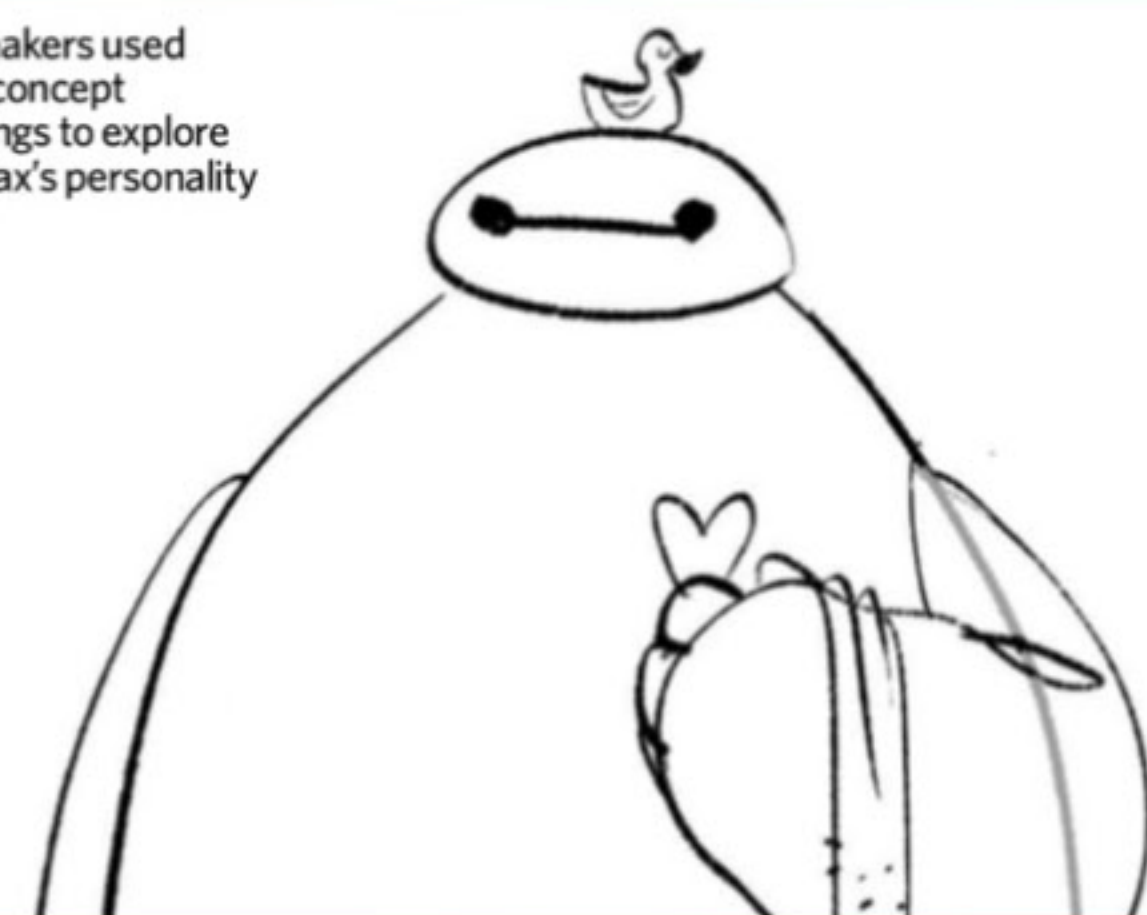
Visual development artist Lorelay Bove created character lineup concept art to showcase the *Big Hero 6* team. Pictured (left to right): Fred, Honey Lemon, Wasabi, Go Go Tomago, Hiro Hamada and Baymax



Animators use character model sheets like this one as a guideline that showcases the character's range of facial expression. Drawings by Jin Kim



Filmmakers used early concept drawings to explore Baymax's personality

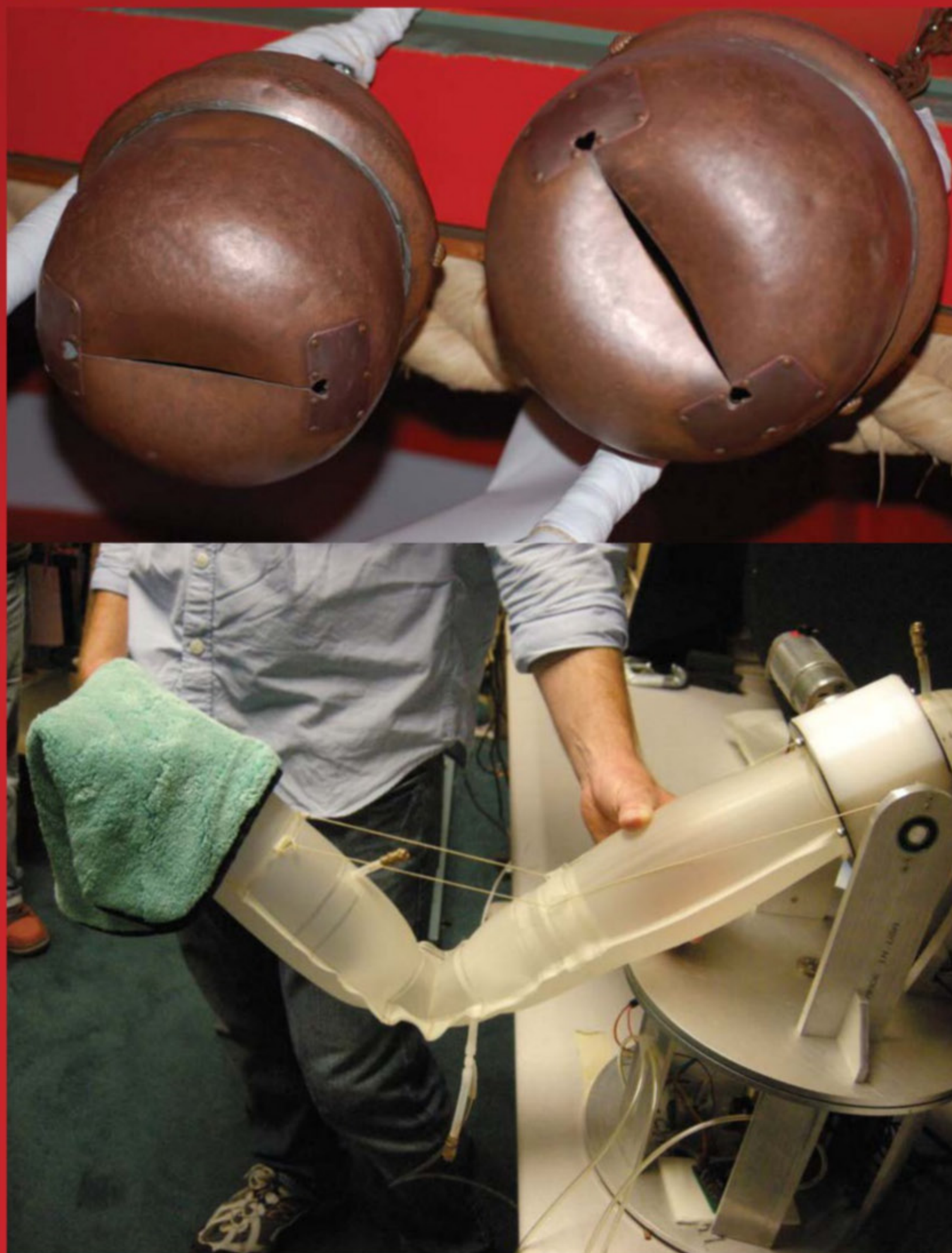


KEY EVENTS IN DISNEY ANIMATION'S DIGITAL RISE

2008 BOLT Oscar nominee for Best Animated Feature	2010 TANGLED Golden Globe nominee for Best Animated Feature	2012 WRECK-IT RALPH Oscar nominee for Best Animated Feature	2012 PAPERMAN Oscar winner for Best Animated Short Film	2013 GET A HORSE! Oscar nominee for Best Animated Short	2014 FROZEN Oscar winner for Best Animated Feature
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Big Hero 6

Japanese bells were an inspiration to Baymax's simplistic facial design and the production team took a research trip to Carnegie Mellon University where they learned about soft robotics, the cutting-edge technology that helped inspire Baymax's inflatable, vinyl, truly huggable design



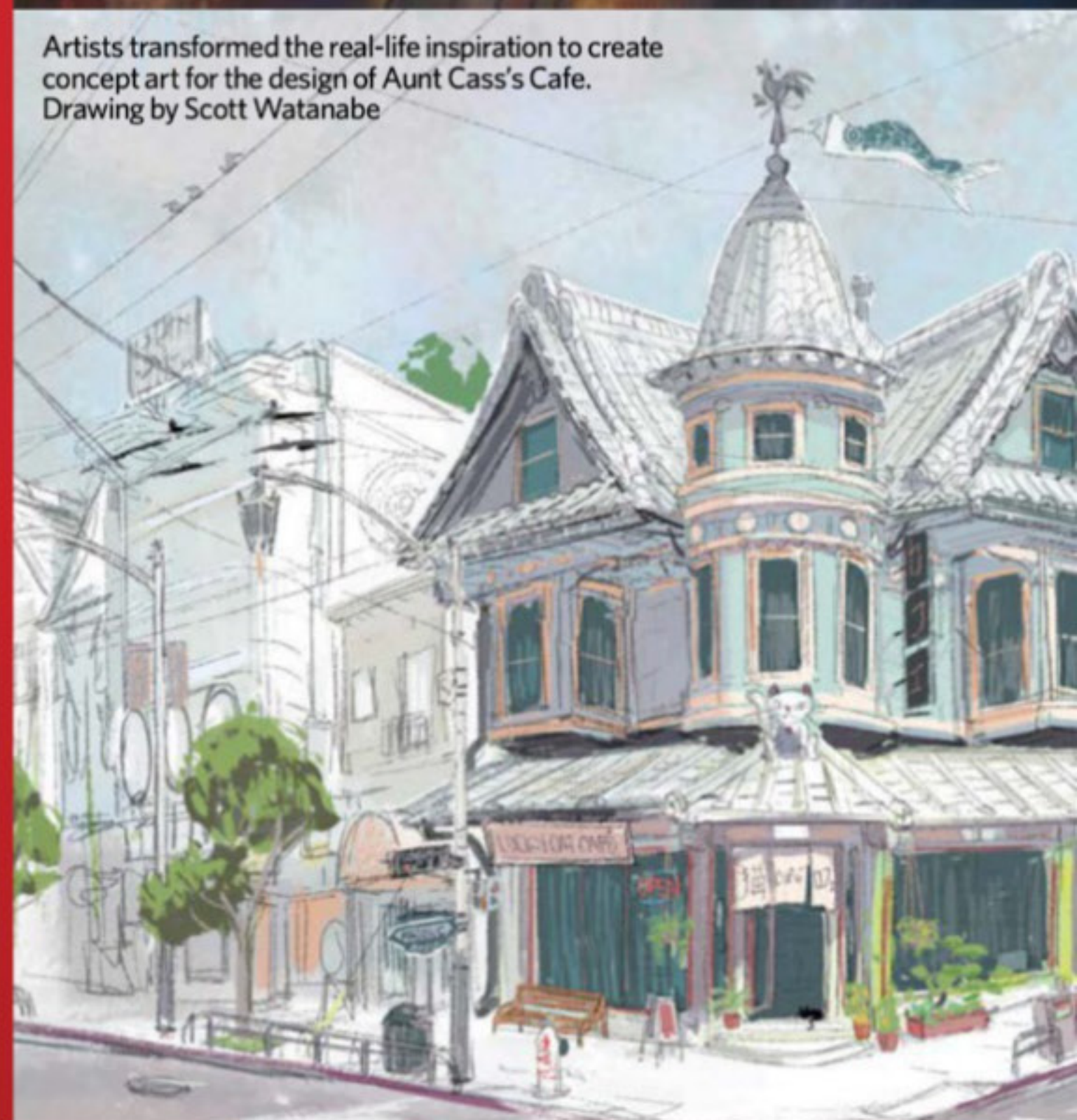
LIFE IN THE BACKGROUND

One of the chief goals of *Big Hero 6* was to create the bustling metropolis of San Fransokyo. "It was really important to us to make sure that this city conveyed a sense of having a true populace," explains Conli, emphasising the importance of populating the city. "We've always thought that a weakness in CG animation was the crowds. We wanted to develop a crowd system that would enable us to not mix and match the colours of clothing, but to literally have hundreds of characters populating our city. We were able to develop a crowd-building system called Denizen that really gave us a greater breadth of character looks. There's a heavy modelling component to it. It allowed our team – if they were interested – to model themselves, and make their characters a part of the crowd. I'm actually in there as well!"

Disney CTO Andy Hendrickson, who recalls how early crowd animation worked back in the days of *Shrek 2*, notes that *Big Hero 6* was the first time that Disney's Denizen tool was used. "It allowed us to create wide varieties of crowds," he enthuses. "They could have different heads and body styles, and follow things like colour scripts. With crowds, you don't really want random patterns of different pants and shirts. In this film, we gave colour scripts to the characters – and then the system could automatically put on the right pants and shoes and shirts on the right body styles. It could also change the clothing to fit the body styles. It actually inflated the body styles and made large and small people. Thousands of people populate the scenes in this movie, and no two are alike. That was a great thing for us to build, and we'll be using it going forward on shows that have crowds in them."



Artists transformed the real-life inspiration to create concept art for the design of Aunt Cass's Cafe. Drawing by Scott Watanabe





"We were able to develop a crowd-building system called Denizen that really gave us a greater breadth of character"

Roy Conli, Producer

CITY BY THE BAY

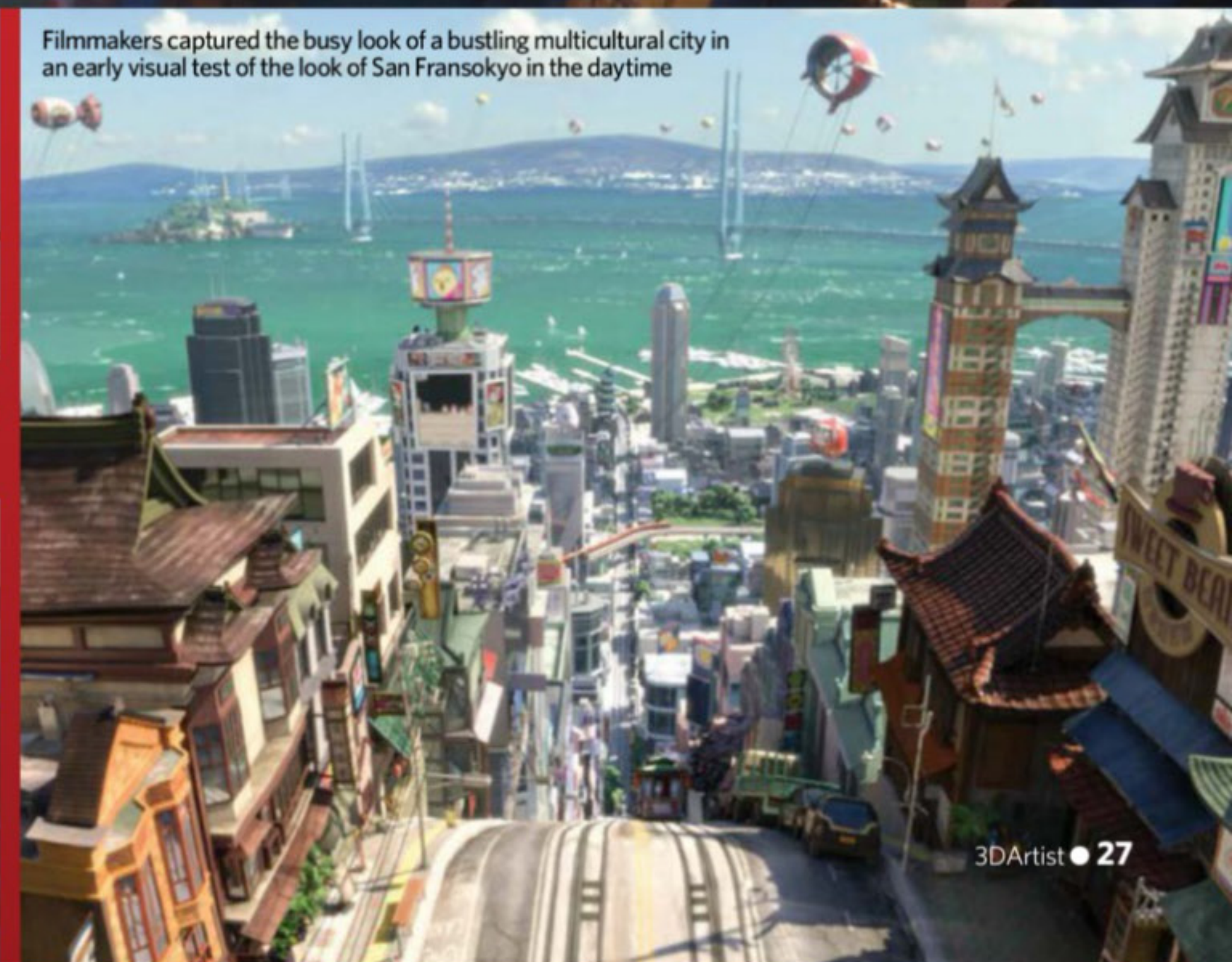
The film's mash-up of Tokyo and San Francisco was not designed to look photoreal, notes Conli. "It's hyperreal." Disney used the off-the-shelf software package CityEngine from Esri to procedurally build the city. Conli explains, "We have about 80,000 unique structures, and the topography is based on USGS (US Geological Society) mapping data. Then we used information from the San Francisco assessor's office to determine the shapes and sizes of different lots. Once we had a procedurally built city, we could spend more time on details like fire hydrants and manhole covers. The set dressing was labour intensive. We had our top artists tricking out a town that no one has ever seen before."

A vertiginous vista of the city at night, with neon reminiscent of Tokyo's Ginza district and the San Francisco Bay Bridge in the background



Filmmakers took trips to both San Francisco and Tokyo and observed their unique architecture to give San Fransokyo its distinct look

An architectural gem of San Francisco that served as the inspiration for Aunt Cass's Cafe



Filmmakers captured the busy look of a bustling multicultural city in an early visual test of the look of San Fransokyo in the daytime

Big Hero 6

CRUNCH TIME

The final test of Disney's new Hyperion rendering system came at crunch time – just a couple of months before the 3D stereo US premiere of *Big Hero 6* on 7 November 2014. Hendrickson states, "Our render farm is quite large at 55,000 cores. It's big enough – and needs enough power – that there is no one single site that can host it. So even though it appears to our artists to be one big virtual machine that operates at their beck and call, it's split into four places. We just don't have the energy and cooling at one site."

Hendrickson explains further, "We have our own cloud that we're executing on right now, and it's quite large. We do around a million render-hours per night. It's quite aggressive, and it's using our

own queuing system called Coda that manages the render farm quite seamlessly. It works well enough that we don't need an overnight staff. It has an iPhone app companion – from your iPhone you can check on how your jobs are doing. You can actually go home and have dinner!"

Looking back on the arc of software development and the production of *Big Hero 6*, Hendrickson remarks, "This is probably the most complex animated film ever made, in terms of the amount of geometry and the number of textures. We're pushing the boundaries of what anybody can calculate and put on the screen."



Hiro prepares to take on his enemies by stuffing the soft and squishy Baymax into a superhero suit. Once inside this suit, the inflatable Baymax – who has a tendency to spring air leaks – becomes a meched-out warrior



BIG HERO 6 BY NUMBERS

2 years is the length of time that Disney's Hyperion rendering software has been in development for.

10 people, spearheaded by engineer Brent Burley, wrote the Hyperion renderer from scratch.

400
55,000

is the number of people that totalled the film's production crew for the entirety of *Big Hero 6*.

cores was the size of Disney's render farm, split across **four** sites.

120 people comprising Disney Animation Technology in software and systems, in a studio totalling around **900** people.

3 times the render time of *Big Hero 6* in comparison the last Disney film. "That might seem like a problem, but the results were worth it," enthuses Disney's chief technology officer, Andy Hendrickson.

300,000-400,000 render jobs each night, thanks to a proprietary render queue system called Coda.



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50 EXPERT TIPS IN MODO

With the new MODO 801 fast becoming the first choice for more and more 3D artists, we asked industry experts to reveal their favourite techniques for using this powerful software

MODO has enticed two types of 3D artists – those who are looking for the whole package in an all-in-one suite, and those that are interested in one or two specific features of its comprehensive make-up. As the software has recently undergone a revitalising revamp, it appears a growing tide of users are switching to the former camp and using MODO 801 for the majority of their 3D art-based needs – resulting in some surprising, new, high-quality projects.

From modelling and texturing to animation, simulation, lighting and rendering, our industry experts take you through the secrets and techniques that helped convince them to make the switch.





GENNARO ESPOSITO

www.artstation.com/artist/ramek81

Bio 3D artist in the commercial and videogame industries, co-founder of PARADIGM404, official partner of The Foundry (www.paradigm404.com)

Location Italy

Software MODO 801, Photoshop

Image title *Interceptor Spaceship*, 2014

Description Based on a concept by Fausto De Martini. I loved the concept, so I tried to model it in 3D using both MODO and Photoshop



STEVE BARRETT

www.stevebarrett.com



JAMES DARKNELL

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BERT HEYNDERICKX aka **ALBERTO EZZY**

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50 expert tips in MODO

MODELLING

01 “Instead of dropping a modelling tool and then reactivating it to start a new action, you can simply press and hold the Shift key and then click in the Viewport to set the current state and reset the tool, all while remaining active for further editing. This works best when bevelling, shifting, extruding, transforming or creating geometry.”

James Darknell

02 “When you copy and paste, the default behaviour is to keep the original elements selected, which certainly isn’t ideal. In System> Preferences>Defaults>Mesh Items, set Deselect Elements After Copying and Select Pasted Elements to On. The software will select only what you just pasted instead.”

Ross Mansfield

03 “Once you create your initial SubD parts, it’s a good idea to keep copies of them throughout the project. This way they can be used often in combination with MODO’s Background Constraint function to help you restore your new geometry in the correct shape.”

Mike James

04 “The X key shortcut serves two purposes for Snapping, acting as a toggle in both cases. Quickly pressing the X key will turn on the current Snapping options so they are active, and then pressing it again will turn it off. Pressing and holding down the X key while doing an operation will temporarily enable or disable Snapping (depending on the current state) until the key is released, so that it will return to its previous state.”

James Darknell

05 “Pie menus are a really handy way of making up to eight shortcuts of commonly used functions or scripts, without needing to remember lots of keyboard shortcuts. Don’t forget the default Cmd/Ctrl+spacebar shortcut for changing view as well.”

Ross Mansfield

06 “After heavy sculpting, it’s a good idea to retopologise your model. With your first row of polygons placed over your mesh, press Shift and Ctrl/right-click to duplicate a whole loop of edges. To retopologise parts like limbs or the trunk of an elephant, start with a cylinder that’s larger in diameter than your underlying geometry. Finish with the Smooth Topology tool.”

Alberto Ezzy

07 “To add your high-resolution sculpted details onto a low-resolution mesh, you need two meshes; one sculpted on the desired multi-resolution level, the second a low-resolution mesh with a UV map. Create a Morph map and use the Push tool to expand the geometry. Add a material onto the low-resolution mesh and then create a new image map. Ctrl/right-click on it and choose Bake From Object To Texture. Next, select your Morph map, distance and bake away!”

Tomasz Lechocinski

08 “The Topology Pen is an incredibly powerful tool for modelling, even if you’re not doing any retopology work. For example, press X to disable Snapping and use it, Shift-click to extrude edges, Shift+Ctrl/right-click on an edge to extrude the whole edge loop, or Shift+MMB to add loops.”

Diego Maricato

09 “Any model with a fixed polygon size has a limited shelf life. So, while the approach of freezing polygons and using Boolean cutters is fine, if you’re faced with a tight deadline sticking to Catmull-Clark, all-quad polygons is best. This also means that you can update your model for higher resolutions by simply increasing the subdivision level.”

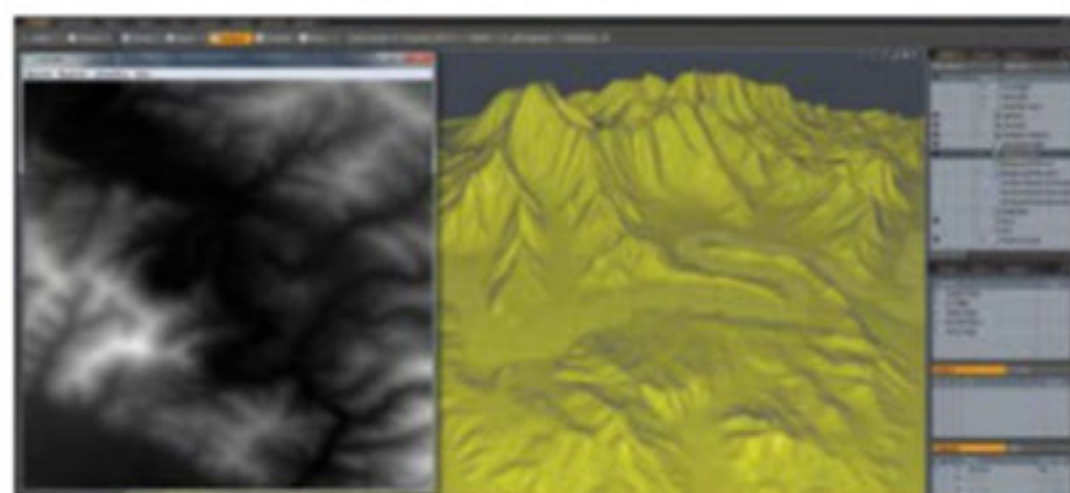
Mike James

10 “Action Centers are the most-powerful modelling functions in all of MODO. Understanding them can save hours of tedious modelling. Users often forget they can be easily swapped using the keyboard shortcuts, Opt/Alt+A for Auto, Opt/Alt+Z for Element and so on. Learning the various keyboard shortcuts can save a whole lot of time.”

James Darknell

11 SCULPTING TERRAIN

Alberto Ezzy explains how to sculpt terrain “Sculpting a believable terrain from scratch is very hard, so I always try to get real-world elevation data. The GeoTIFF format is ideal to use as a 16-bit Displacement map in MODO.”



“A great feature is Convert To Multiresolution, which can be found under the Paint Utilities tab. This converts your mesh, so that you can sculpt and refine it further.”



“The Displacement map is then no longer needed, but I usually apply it as a Bump map as it gives extra detail to the terrain.”



Tip 5 © Ross Mansfield

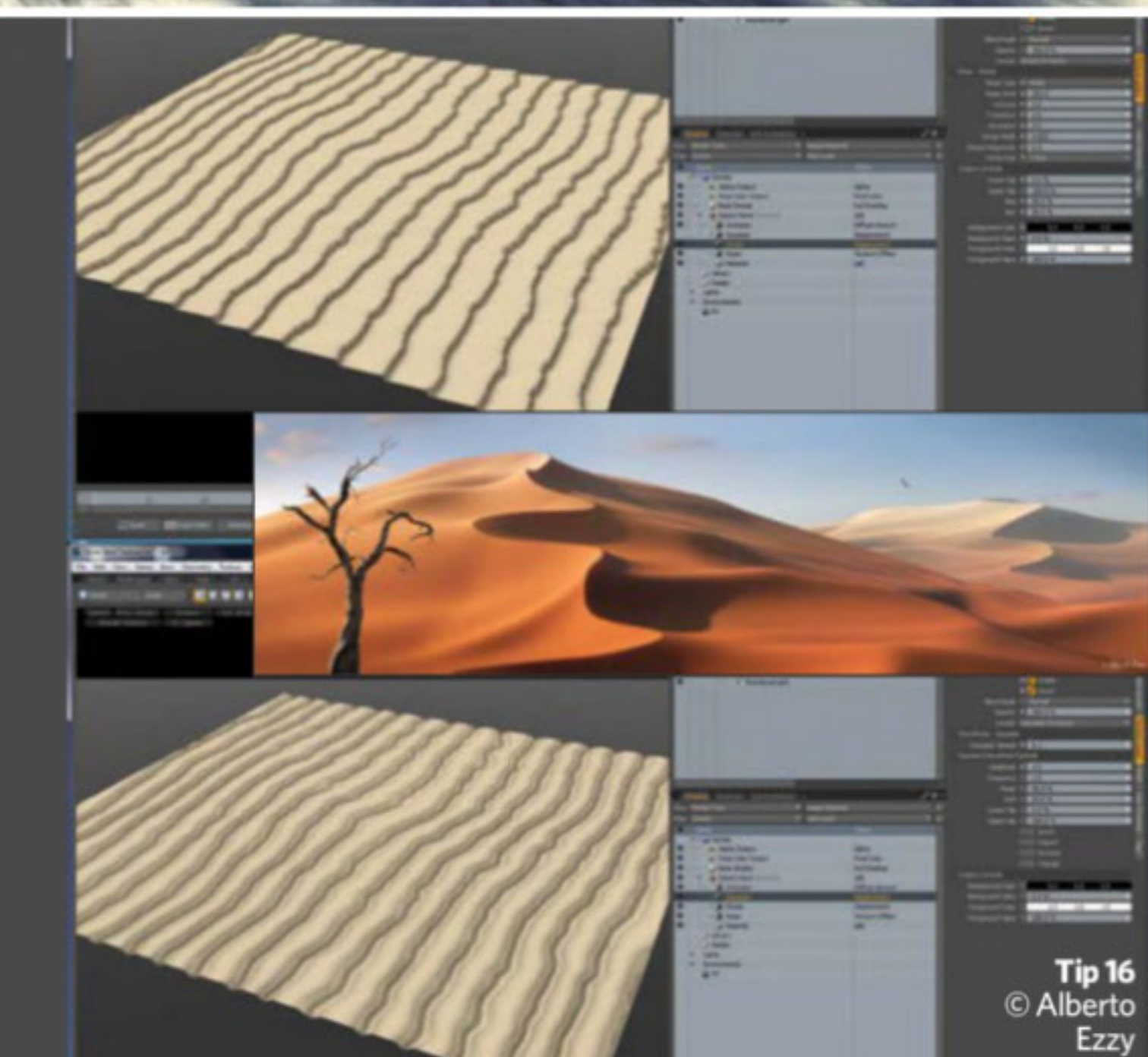




Boeing 747
© Mike James



El Tamarindo
© Alberto Ezzy



Tip 16
© Alberto Ezzy

MATERIALS & TEXTURES

12 "Glass always needs something to reflect, or it feels flat, so load in an environment to help. Use high Fresnel values on reflections for increased realism, and the Transparency amount should never be 100%. Absorption Distance helps to tint the glass realistically and you can also change the Exit Color to adjust this even more." **Caetano Silva**

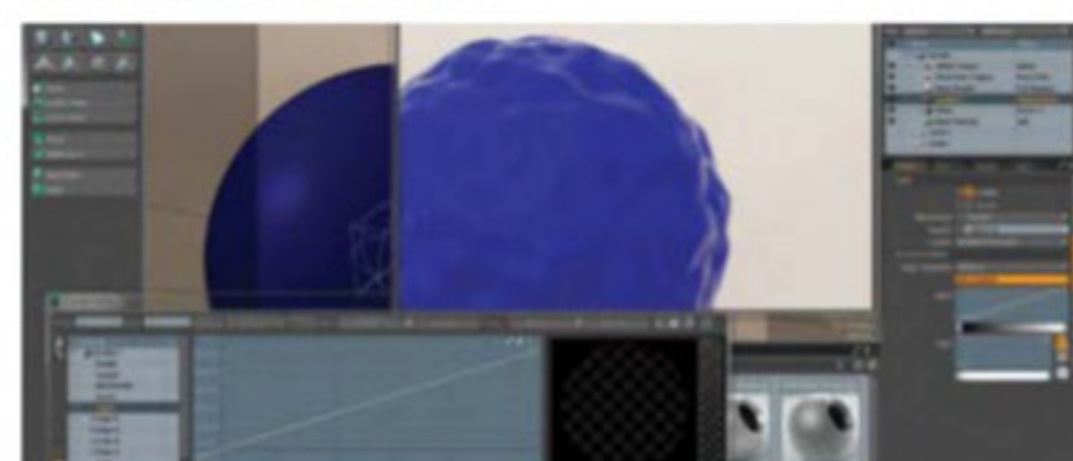
13 "Great texture variation can be achieved by using texture replicators, which is also known as texture bombing. It's a really quick and simple way for creating water. I use three different greyscale image maps of rippled water surfaces for Bump mapping and place them into a group. MODO then randomly picks whatever is in that group to create textures without visible tiling." **Alberto Ezzy**

14 "In MODO 801 there is great new feature for importing images from MARI using UDIM numbers. I find this extremely helpful when I have to manage large texture sets. I use this process for character skin-creation, as the MODO Skin Shader requires a lot of maps that I paint in MARI and then import into MODO." **Tomasz Lechocinski**

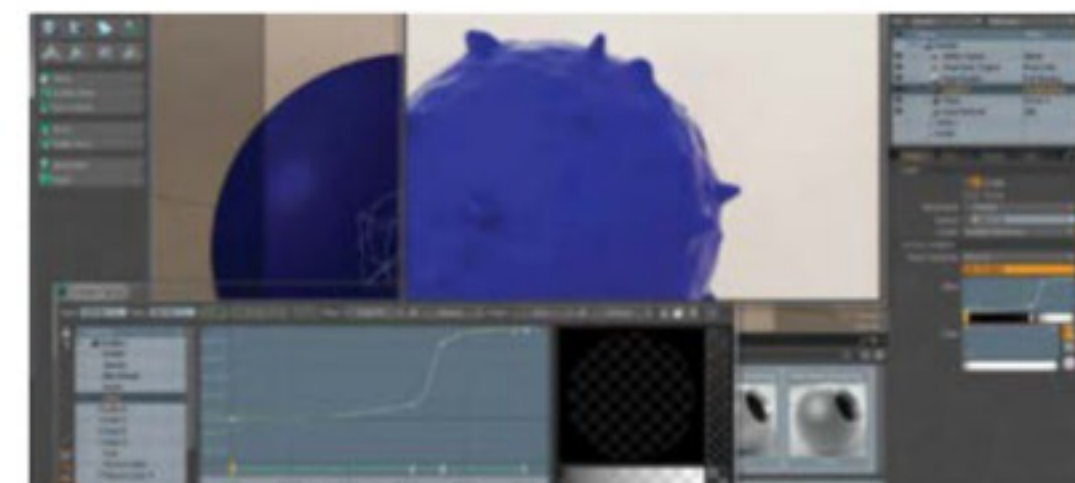
15 "I like to bake detail geometry as I'm modelling, such as piping, ribbing or seams, turning it into Displacement maps. It's easier to manage deforming geometry on a simpler mesh, and enables me to layer the resulting baked images in the Shader Tree, setting their individual blending modes to Add." **James Darknell**

16 "If you're using a procedural texture but find it too sharp, the trick is to blur it with a Gaussian Waveform layer in MODO. Make sure you position this layer directly above the Procedural layer and set its Effect to the same setting. I used this technique to make the ripples in the dune sand in my Namibian Desert image. I applied a Strata procedural with a Noise Texture Offset for randomness and a Gaussian Waveform to blur the sharp Strata edges. Both layers were set to Displacement." **Alberto Ezzy**

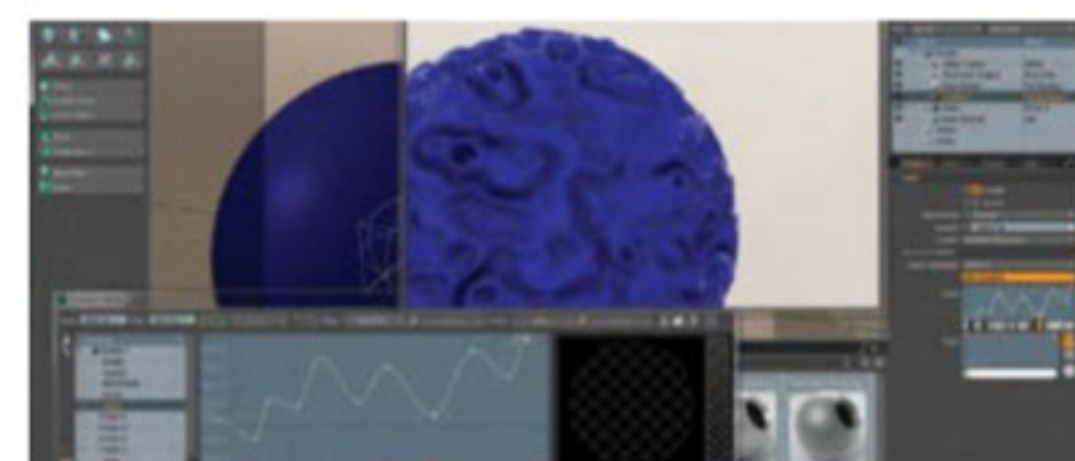
17 PROCEDURAL TEXTURES
Explore Gradients techniques and more
"Procedural textures can be adjusted using a curve-type interface by way of Gradients. This technique extends the utility of Procedural textures, while retaining their resolution and size... In the Shader Tree, set the Procedural Textures Effect to Driver A and likewise for the Gradient's Input Parameter to Driver A."



"After setting the Gradient layer's Effect to Displacement, make sure that there is also an appropriate Displacement amount defined on the Material item. I've set a few keys here to produce a subtle effect."



"Here I've set a number of keys in the Gradient Editor using the middle mouse button and adjusted them up and down, creating a pronounced affect on the original simple noise texture." **James Darknell**



18 "Working with UDIM enables you to boost your texture resolution and gives you greater flexibility. It's always a good idea to split the UV patches up into materials, such as plastic, metal, glass and wood. For a more efficient workflow, it can be handy to include the patch number at the back end of the material name." **Mike Jagodzinski**

19 "I find that Image Ink is not only a great texturing tool for MODO 801 users, but it is also a great way to generate modelling guides. When you combine this with the Retopology tools that are on offer, it makes quick work of what were once considered to be complicated models." **James Darknell**

20 "Volumes in MODO are great for creating elements, such as clouds. By assigning an Item Mask to the Volume, you can texture them. I usually choose Planet Clouds and Puffy Clouds layers set to Volume Density. You can create different types of clouds by experimenting with the Layers and Volume settings." **Alberto Ezzy**

21 "To really push the realism of your assets, it's always important to add the appropriate maps to add enough detail and break up the repetitive look of your materials. With hard-surface assets, it's very important not to forget about the little imperfections that are always there in real life." **Mike Jagodzinski**

50 expert tips in MODO



Dream IX
© Steve Barrett

22 TEXTURE LOCATORS

James Darknell explains how Texture Locators can be used to easily apply decals to a target surface

"The image map is placed into the Shader Tree under the Group Mask and its Texture Locator's Projection should be set to Planar on the Y Axis, with Horizontal and Vertical Repeats set to Reset."



"In Items mode, the Drop Action should be set to Place And Align. By simply dragging over the Texture Locator's representation on the car, the texture is automatically aligned to the surface."



"Opening Preview, you can see the final result of the decal, enabling a few additional tweaks using the Transform tool. Scale the texture to a negative value on the X axis to orient it properly."



23 "Render Booleans in MODO are a great way to reveal complex portions of an illustration. You can assign a custom mesh from the Item list via the Boolean object. For more advanced cuts, assign a unique material of its own to the Boolean, or have it inherit the target mesh material."

Mikel Jagan

RIGGING & ANIMATION

24 ANIMATE AN OBJECT IN MINUTES
Pascal Nocquet explains how MODO's tools can animate an object with ease

"If you desire greater control over an item when rigging with the Order of Operation (OoO) workflow, you can simply Ctrl/right-click on the Rotation channel and go to Add Pre-transform>Rotation. Drag that new channel in the Schematic and you can now control the item."

25 "It is possible to animate an object, like making a wing flap during flight, in three simple steps. Find the Setup tab in Item mode, and place the centre of your mesh at the right position to define its rotation point. In the Schematic View, add the appropriate Rotation channel and connect it by going to Channel Modifier>Channel Oscillator."

26 "To check your progress, press Play and adjust the Amplitude and Frequency in the Oscillator Properties to suit your animation. The next stage in the process is to Ctrl/right-click on the wing item and add a Bend Deformer. Adjust both the Position and the Rotation of the mesh, and last of all, connect the Angle channel to the Oscillator."

27 "To finish the animation of the wing, add a Time Offset modifier. Place it between the Oscillator and the Bend Deformer. Now press Play again and adjust the Time Offset, Oscillator Amplitude and Frequency until you get the most-perfect result possible."

28 "Actors are simply collections of items that make it easier to set keyframes for all the associated items at once. Actors are created by selecting the target items and using the Create New Actor option. Once defined, pressing the Set Keyframe button will automatically set a keyframe for all of the animated channels in the Actor."

James Darknell

29 "The Track view - or Dope Sheet, as it's called - is hidden in the animation UI within the timeline. It can be opened by clicking the top of the timeline frame and dragging upwards. With it you can easily adjust the timing of keyframes, displaying the keys for all selected items." James Darknell

30 "It's worth spending more time than you think is necessary on the documentation stage of any project. If you have great drawings, a variety of photos taken under different lighting conditions, and a well-thought-out storyboard of animation, you're much less likely to paint yourself into a corner later." Mike James



Steampunk Cashmachine
© Pascal Nocquet

31 “The Pre and Post Behavior options in the Graph Editor enable users to control the way animated items act before the first or after the last defined keyframes. The Repeat, Offset Repeat and Offset Repeat Smooth options allow users to very easily create looping or repetitive motions by simply creating a few keyframes for the initial motion and then setting the proper Post Repeat Behavior.”

James Darknell

DYNAMICS & SIMULATION

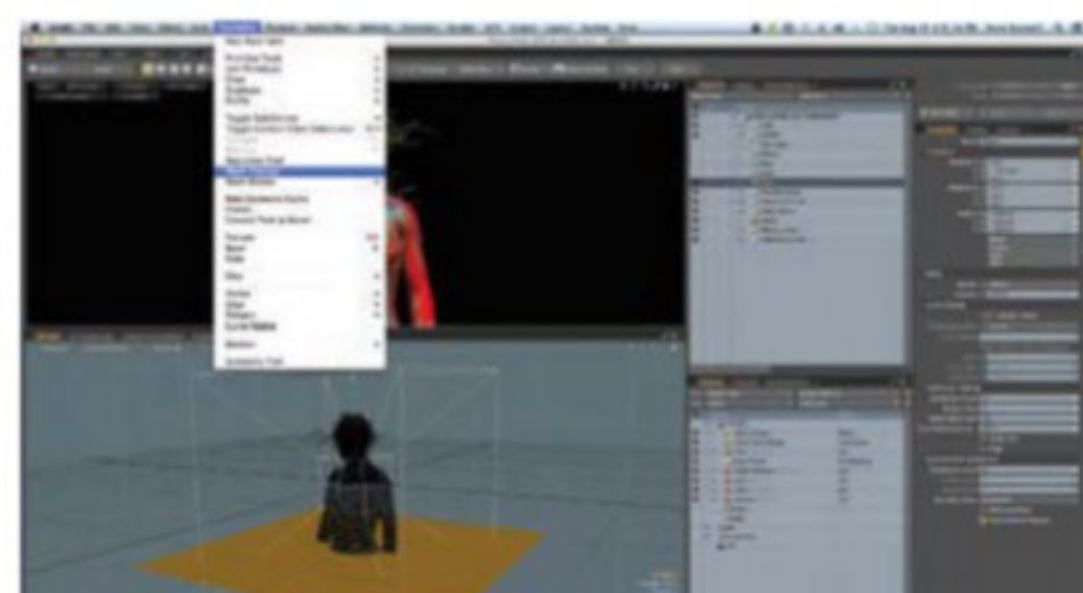
32 “For slow-motion dynamics, under Channels add a Time Scale solver. The default is 100%, so bring it down to 10% for slow motion. Alternatively for an animation preview, record a quick Open GL animation by Ctrl/right-clicking over MODO scene windows.”

Steve Barrett

33 MESH SHATTER TOOL

Steve Barrett reveals how to use the Mesh Shatter tool to create explosive results

“Before using the Mesh Shatter tool on your mesh, use the Geometry>Mesh Cleanup Command to clean up any extra geometry. Make sure your mesh has no missing polygons or holes, or it won’t work.”



“Connect and select all of the geometry (Polygon mode) and run the MS command. More mesh resolution equals more complexity in the shatter, so run the Subdivide Polygons command to give you more mesh resolution.”



“Select your geometry and under Setup>Dynamics> Make Active Rigid Body Dynamics to add Gravity to your model. Last of all, make a ground plane and make it a Static Rigid”



34 MASTER MODO PARTICLES

Pascal Nocquet takes you through using Particles in your projects

“You can make a model with moving particles in three easy steps. The first thing to do is set up a simple Radial Emitter on Y, with a rather low Emission Rate, like three-quarters for example, and

activate Gravity. After a little bit of fiddling, cache the simulation when you’re satisfied.”

35 “Now select the Particle Simulation in the Item list, and open the Sculpt window (F3). There’s a Particles tab, so open it and select Mesh From Particles at the top. It should create curves that visualise the paths of the particles in a mesh parented to the simulation.”

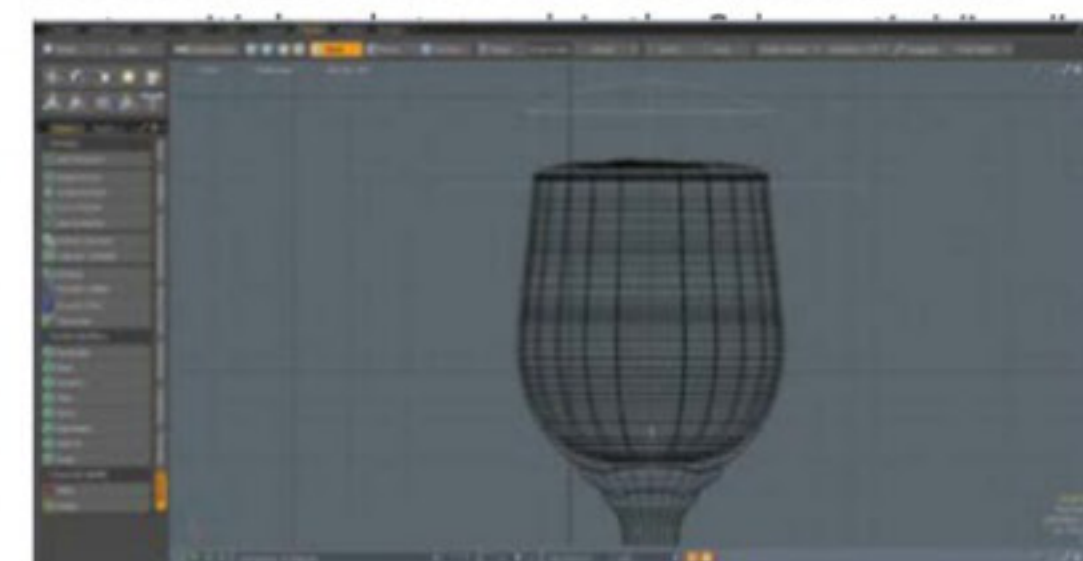
36 “You can now use those newly created curves in a number of ways. For example, you can sculpt them with the Sculpt Particle tools and shape your simulation for a professional result. Alternatively you can make them dynamic or add forces and even render them. The list is endless.”

37 “A good way of getting rid of stray particles in regards to newly created curves is to delete some of them, and then click on Particles From Mesh. It’s worth remembering, though, that if you do this, those paths won’t be used anymore.”

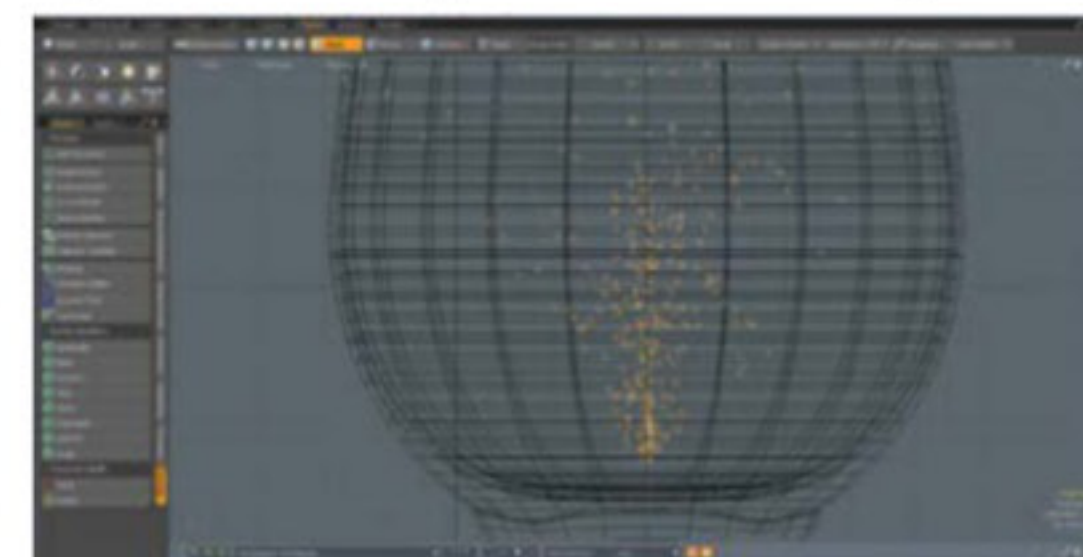
38 ADD SOME FIZZ

Ever wondered how to make fizzy drinks fizz? Alberto Ezzy shows us how

“Particles are ideal if you want to simulate little bubbles inside fluids. When setting up a particle



“First choose Add Simulation under the Setup/Particles tab. Connect it with a Radial Emitter and adjust the Cone Angle to the radius of the glass.”



“Connect a Replicator that has a little sphere as a prototype. Don’t forget to compute and cache the simulation or it won’t be visible at render time.”



39 “If you get stuck, just ask any question to the MODO community. Visit www.community.thefoundry.co.uk for more.”

Pascal Nocquet

50 expert tips in MODO

LIGHTING & RENDERING

40 "MODO's Non-Photorealistic Rendering kit is an optional plug-in that can be purchased for enhanced results. It is perfect for producing charming and professional effects. I've made use of these effects to simulate sketch lines on the machine illustrations as a separate render output."

Mikel Jagan

41 "Don't be afraid to use MODO's render outputs in the Shader Tree for greater control over reflections, highlights and other key data passes in post. MODO's Surface ID pass is an invaluable, time-saving tool that enables you to quickly mask, select and edit components in a render when compositing."

Mikel Jagan

42 "One thing to keep in mind when working with subsurface scattering (SSS) in MODO 801 is to enable Both in the Subsurface Scattering menu, located in the Global Illumination tab of the Render Settings. This will ensure that MODO can calculate the indirect lighting in the SSS shading, such as the lights that come from HDR images. This leads to much better SSS results in your renders."

Caetano Silva

43 "MODO doesn't have a way of rendering wireframe edges directly like LightWave, so the best way to do it is to convert the edges of the model to curves and use the Render Curves option. This also gives you editable control over the thickness of the wireframe and will render at the same time as the image so you don't need to composite it."

Ross Mansfield

44 "One of the coolest features in 801 is the ability to set a default scene. This enables you to set initial values and options for new scenes, like Frame Render size, AA level and GI options. I use them to define basic three-point lighting, so my models are rendering ready right out of the gate."

James Darknell

45 "MODO 801 introduced colour management with OpenColorIO – great for SFX workflows, but not so good for ICC-centric Photoshop. However, if you switch the Color Management preference in your Scene item to the Foundry-v1 config, then you can assign the more familiar AdobeRGB and ProPhoto colour spaces to your render outputs."

James Darknell

46 "When rendering enormous images, split it into multiple pieces using the Render Region option. Define a specific area by first changing the Right value of the Render Items Frame settings to 30% and then do a render. Next, change the Left value to 20% and the Right to 60%. Then assemble the strips in Photoshop, masking out any visible seams."

James Darknell

47 "To fully comprehend how light works, go to MODO 801's online help system at <http://docs.luxology.com/modo/801/help/index.html>. Here you can find the light that you want to use and discover everything you need to know about its uses and properties. For example, directional light, area light and photometric light are some of the main ones that are used."

Edo Triviño

48 "With MODO 801, the days of changing every image map's Gamma to 0.4545 with a scene Output Gamma of 2.2 are gone. Just leave your scene's Output Gamma at 1.0 and set the Colorspace to sRGB. Then set the LUT of the Preview Renderer to sRGB too."

Alberto Ezzy

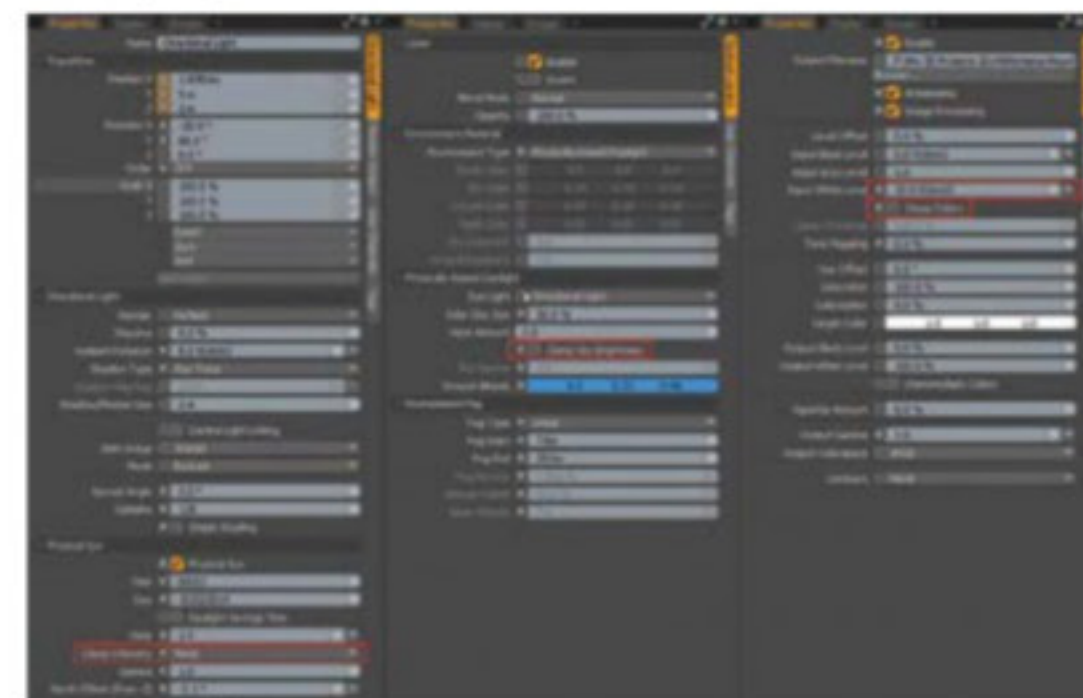
49 "When I need a quick preview to show the client, the Preview's Render Animation

option saves the day. It enables me to render out an entire animation, specifying the amount of time I want it to take. It basically divides up the length of time by the number of frames and spends that long on each frame so I know exactly when the render will be done."

James Darknell

50 PERFECT RENDERING
Alberto Ezzy tells us how to execute perfect rendering

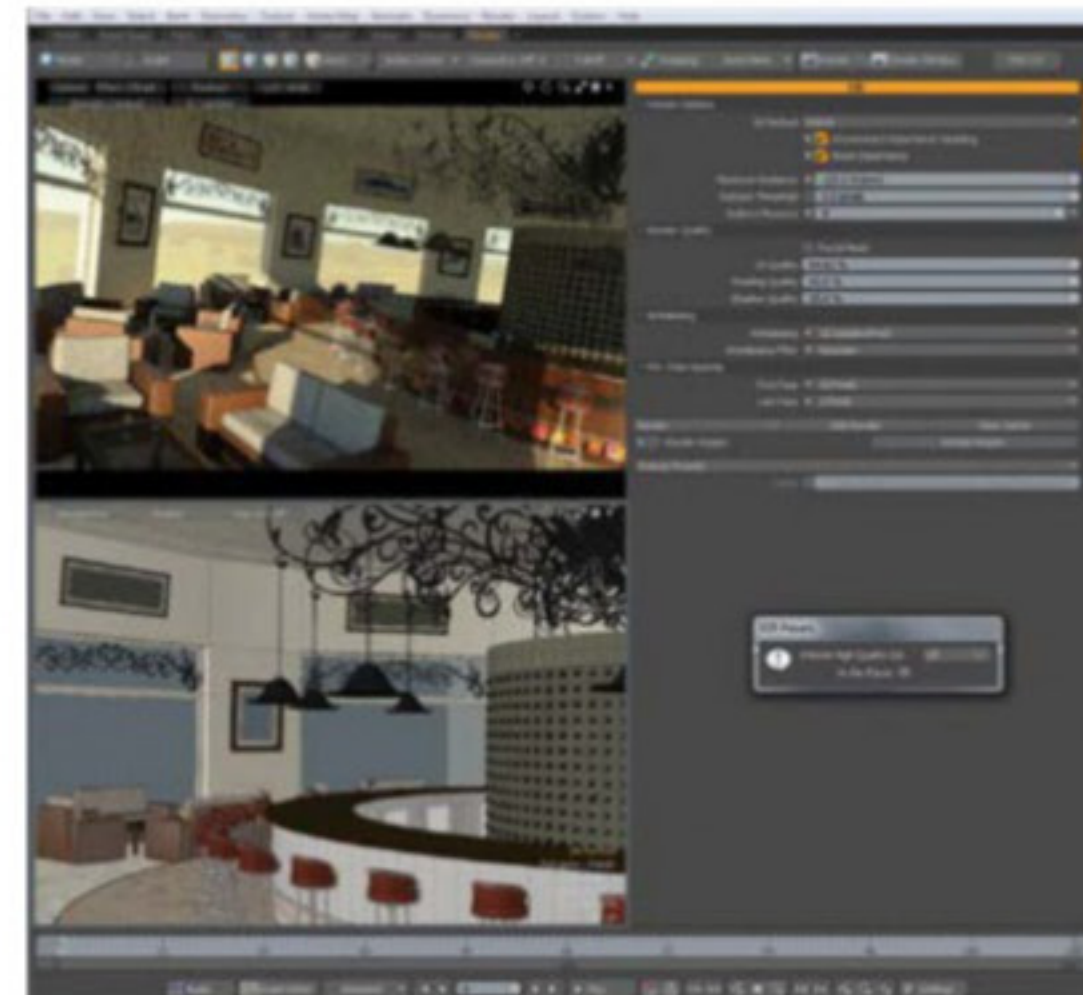
"I prefer my MODO renders with Clamping set to Off. Without Clamping you get a deeper, richer render. There are a few places where you can toggle Clamping On or Off."



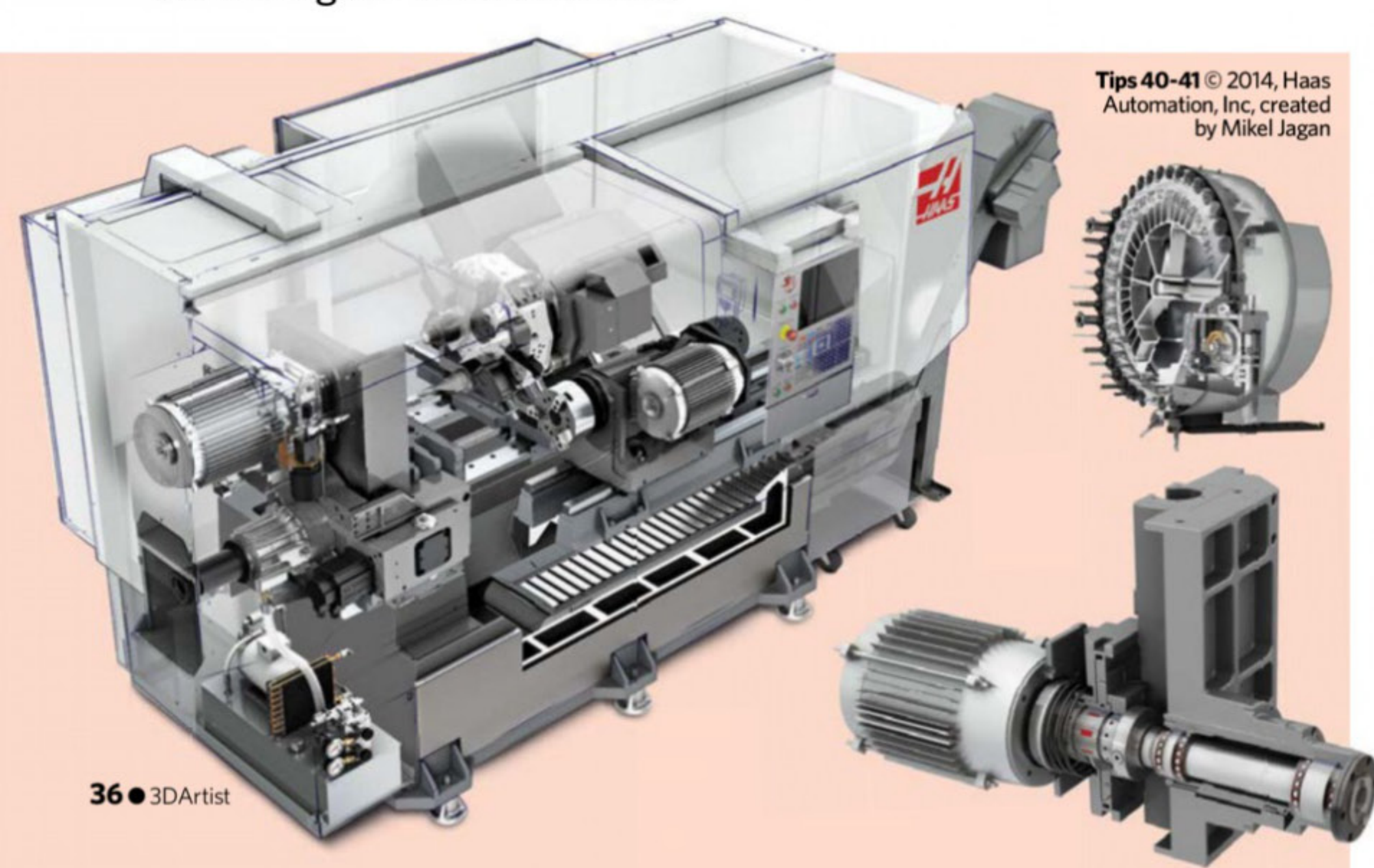
"To get the most out of your HDR images when lighting your scene, make sure EIS is enabled in the Global Illumination tab. It produces a more accurate and smoother result without having to sacrifice on render times."



If you don't like to fiddle with all the Render settings, and would like more of a one-click solution – especially for interior rendering – there is a great plug-in called XSR (www.openconcept3d.com).



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POST-PRODUCTION After building it in ZBrush, the model was exported to Cinema 4D where I set up a scene using modified copies of the mountain top for the background and another photo mapped onto a foreground object. Figures were rendered separately and composited in Photoshop along with other cloned and hand-painted figures. **Making Myths: Benstravaig, 2014**



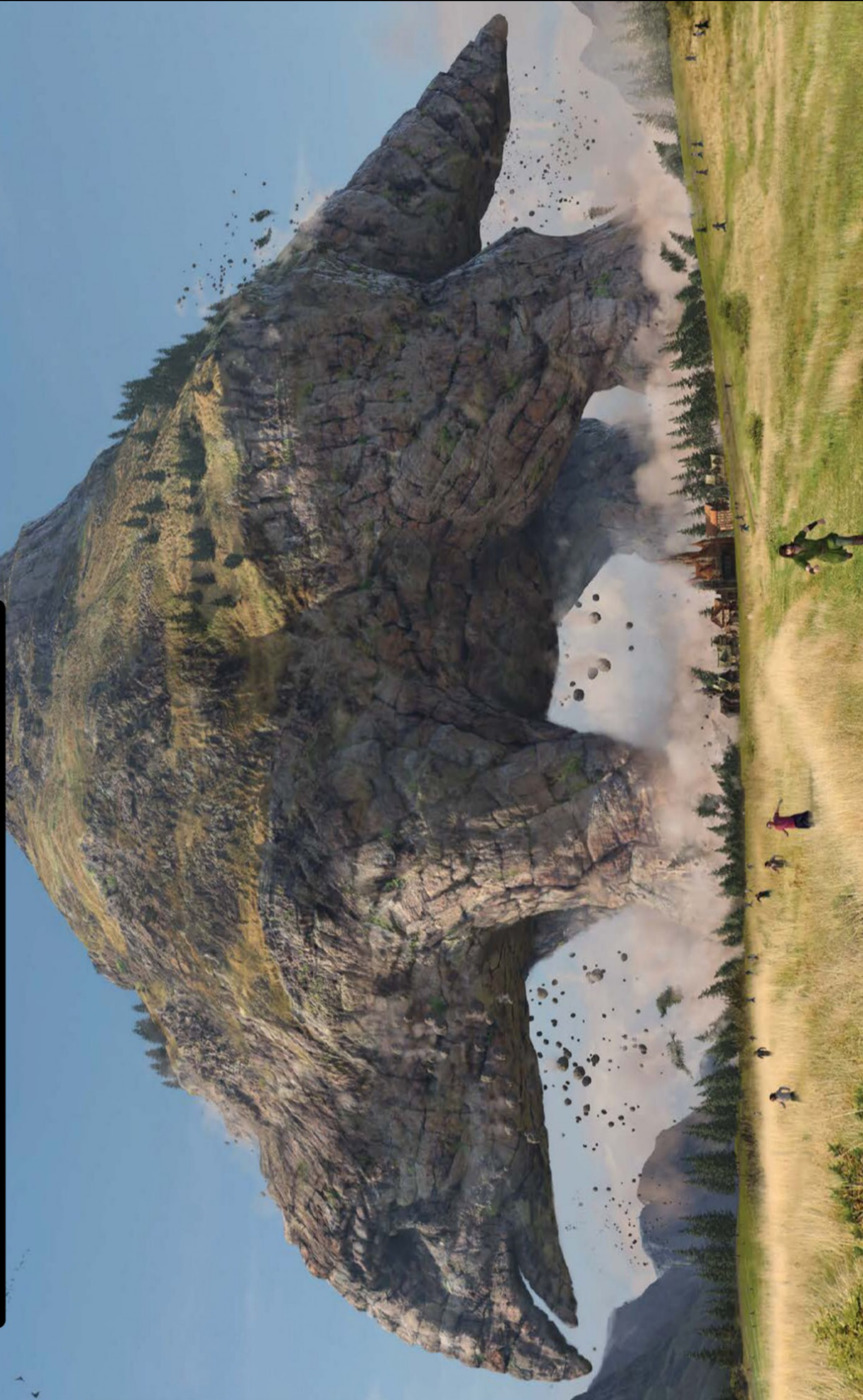
Sav Scatola

Website www.boxy.co.uk

Country Scotland

Software used ZBrush, Cinema 4D, Photoshop

Bio After studying creative computing, Sav does visualisations in 3D for the marketing industry





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Step by step

Easy-to-follow guides take you from concept to the final render



Ng Jian Han

Personal portfolio site
www.jianhan.artstation.com

Country Malaysia

Software used Maya,
Photoshop, Quixel Suite

Expertise Hard-surface
character modelling and the
texturing process

Build your own creature mech

V.O.L.F. 2014

“ Learn how to execute a concept from a single still image and take it a step further ”

Ng Jian Han is a freelance modeller specialising in modelling, texturing and compositing

Based on Shannon Lee Guy Brocas' concept art, we will go through the process of taking an idea from conception through to finished result, making improvements based on personal interpretation.

Since most of the forms and concepts have already been created by the concept artist, our job is to bring it into 3D space and to make sure that the design pulls through. Since this was a personal project, I took the liberty of adding and removing elements that I believe develop the overall form.

I'll cover simple steps that will be helpful in building a mech based on someone else's design – or even your own.

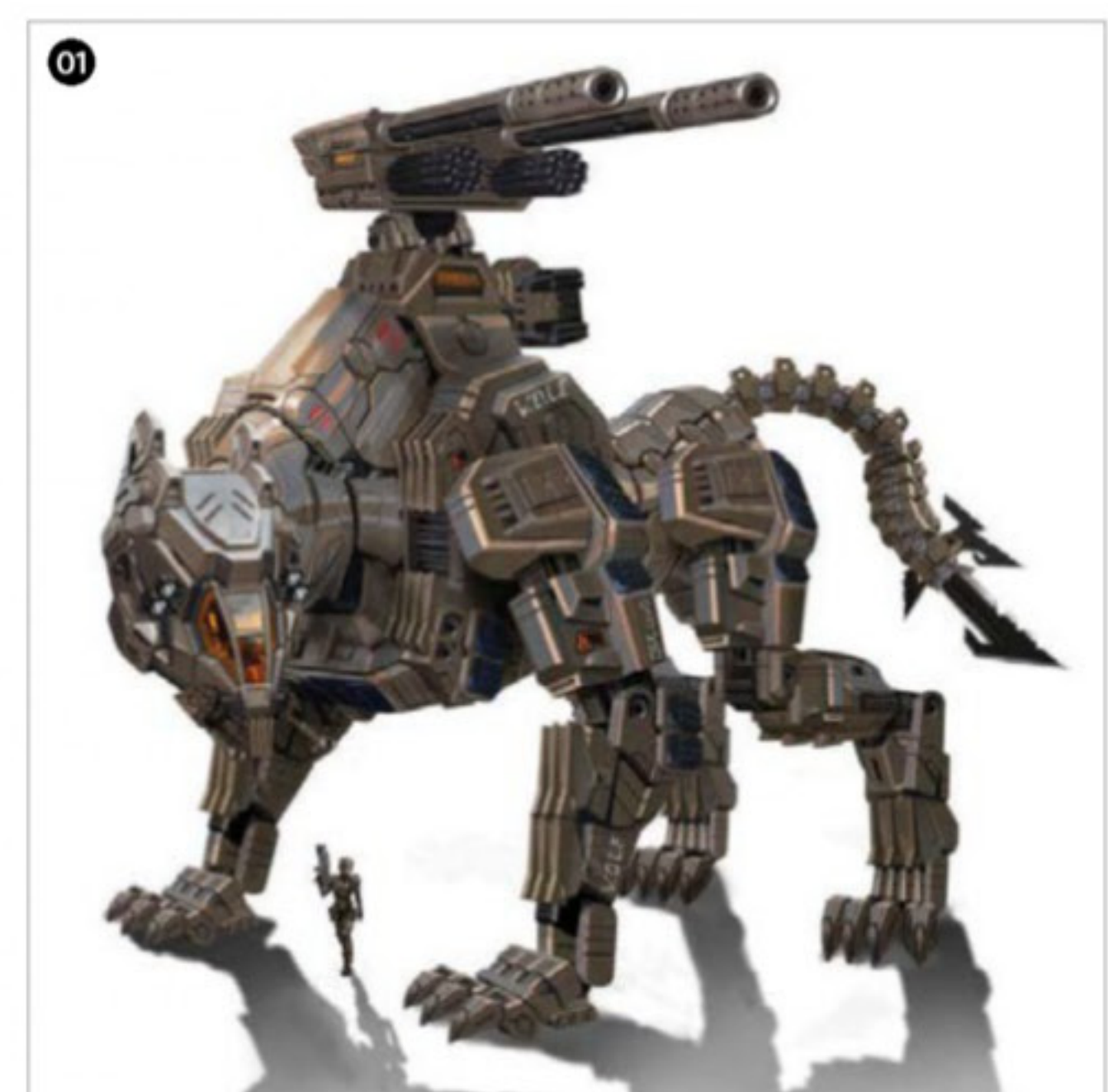
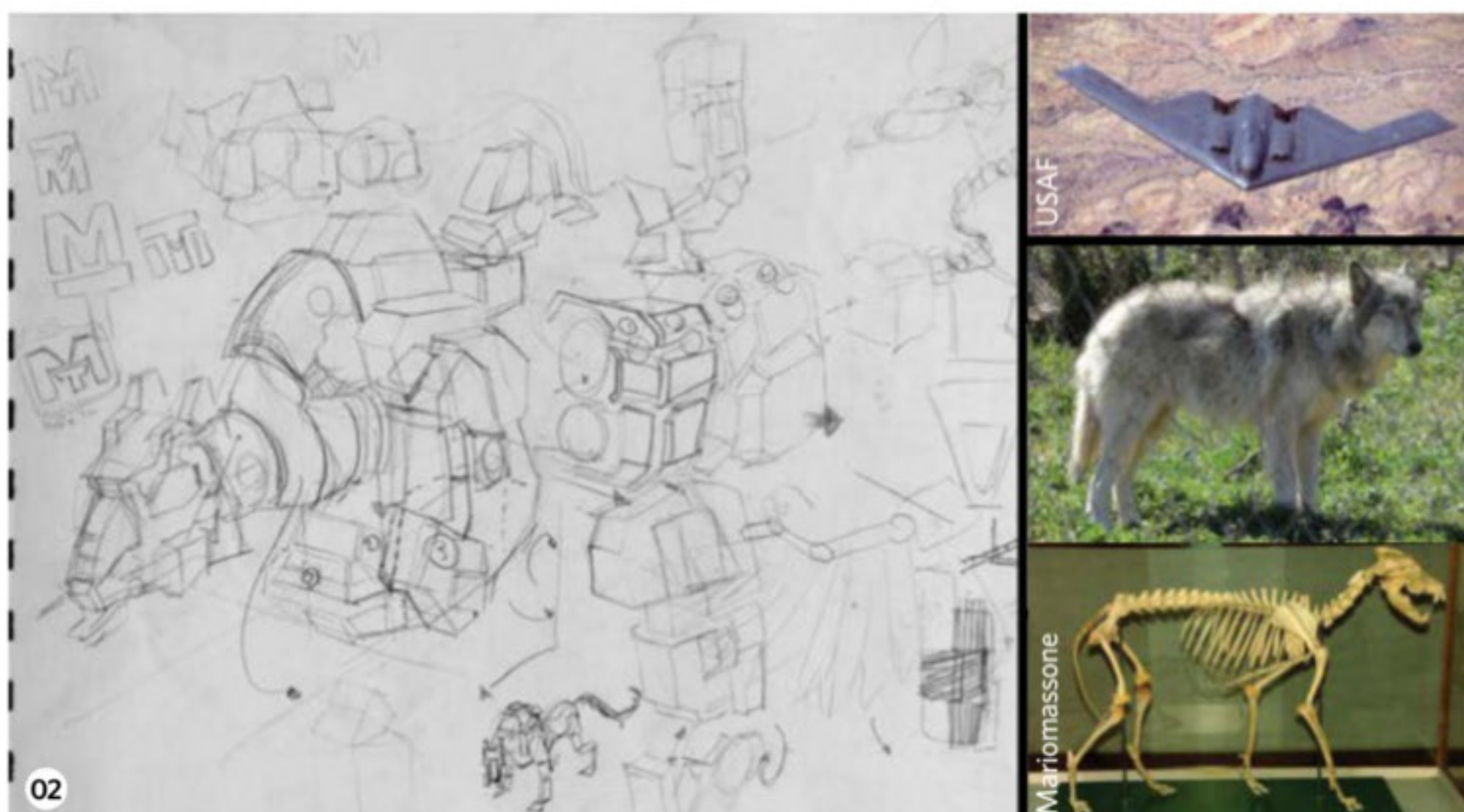
We'll go through a basic workflow from start to finish and follow the traditional workflow of gathering references, blocking, creating high-poly models, UV unwrapping, texturing, applying materials and then compositing.

Everything here will be made in Maya and textured in Photoshop (coupled with Quixel Suite for Normals). Both these software are good enough to create a convincing machine. However, most of these techniques can be applied to other 3D programs. Hopefully by the end of this tutorial, you'll take away some new techniques that could be used to benefit your own projects.

01 Understand the concept Upon receiving the design, it's good to know where the concept came from and how the artist came about it. From there we can start to take a look at real-life references, which will be the primary source of all inspiration for the project. If you can't find out information from the artist, you can imagine what they were thinking during the creation process. After that, plan how to build the forms, clarifying parts that are unclear in the concept, or that are not visible. In the case of my project this meant its back, chest, behind the head, the rear and any internal parts.

Think of a story

One great way to carry the model forward, as well as adding depth, is by creating a story for your character to be a part of. Imagine where it was created, what it has been through, and what year it is – these are all great questions that can help you to prepare your scene. It's these kind of considerations that really add to the believability of your character.



02 Self-study A lot of the time it can be very helpful to make a rough sketch to plan out how to build the objects, particularly when it comes to posing and animating your character. As I only have a still image to work from, I either have to create orthographic planes or make sure that I understand what will be built. After that, gather as much reference on any changes that will be made. In this case, I wanted the machine to be stealthy and quick, so I gathered references on stealth bombers. I also gathered references of wolves, given that the concept was based on that. Understanding how real wolves move helps you establish which joints should be used for each limb.



Learn how to

- ✓ Build from a concept
- ✓ Get the most out of your textures
- ✓ Take advantage of render passes
- ✓ Composite your render

Download

Tutorial files:
• Tutorial screenshots

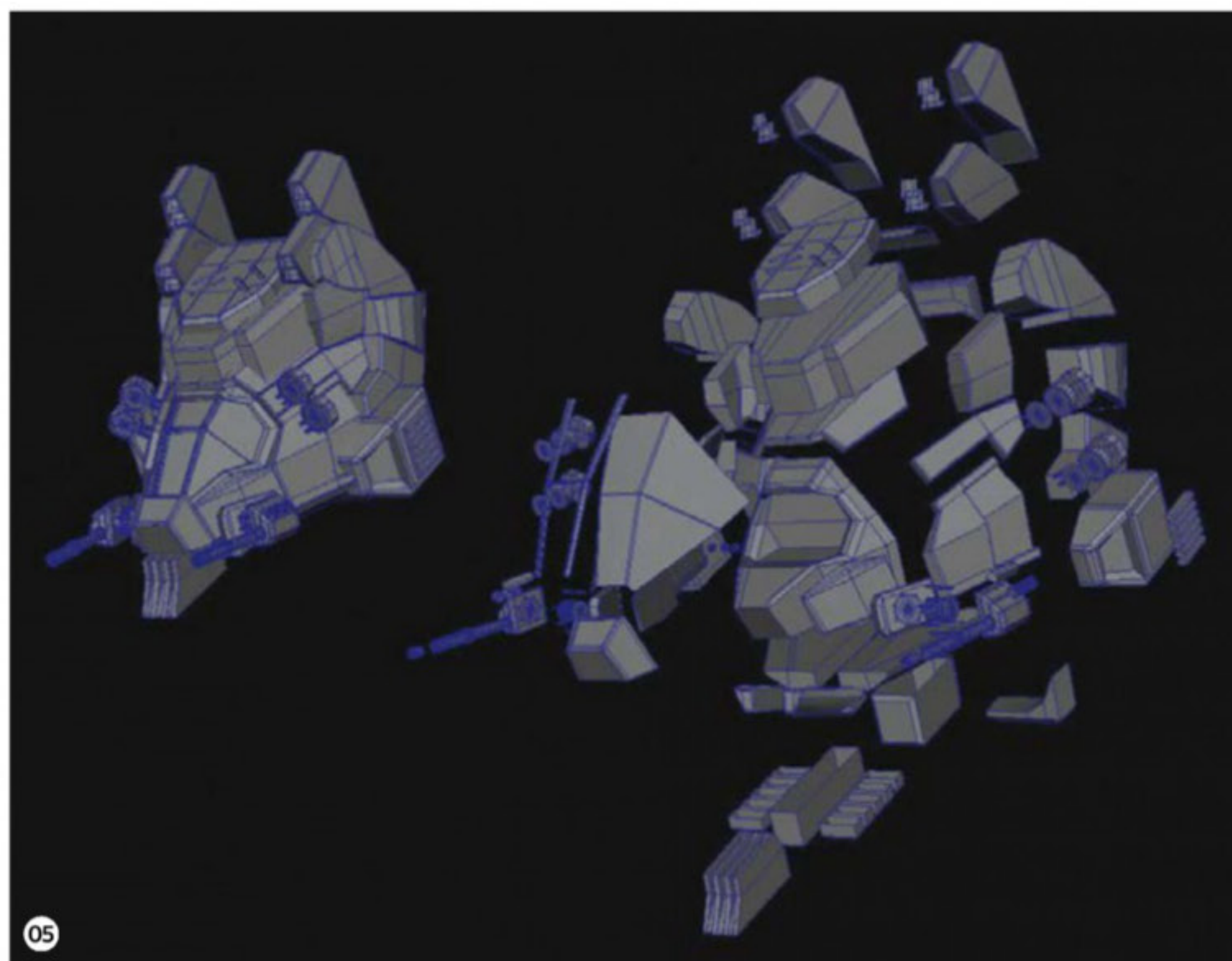
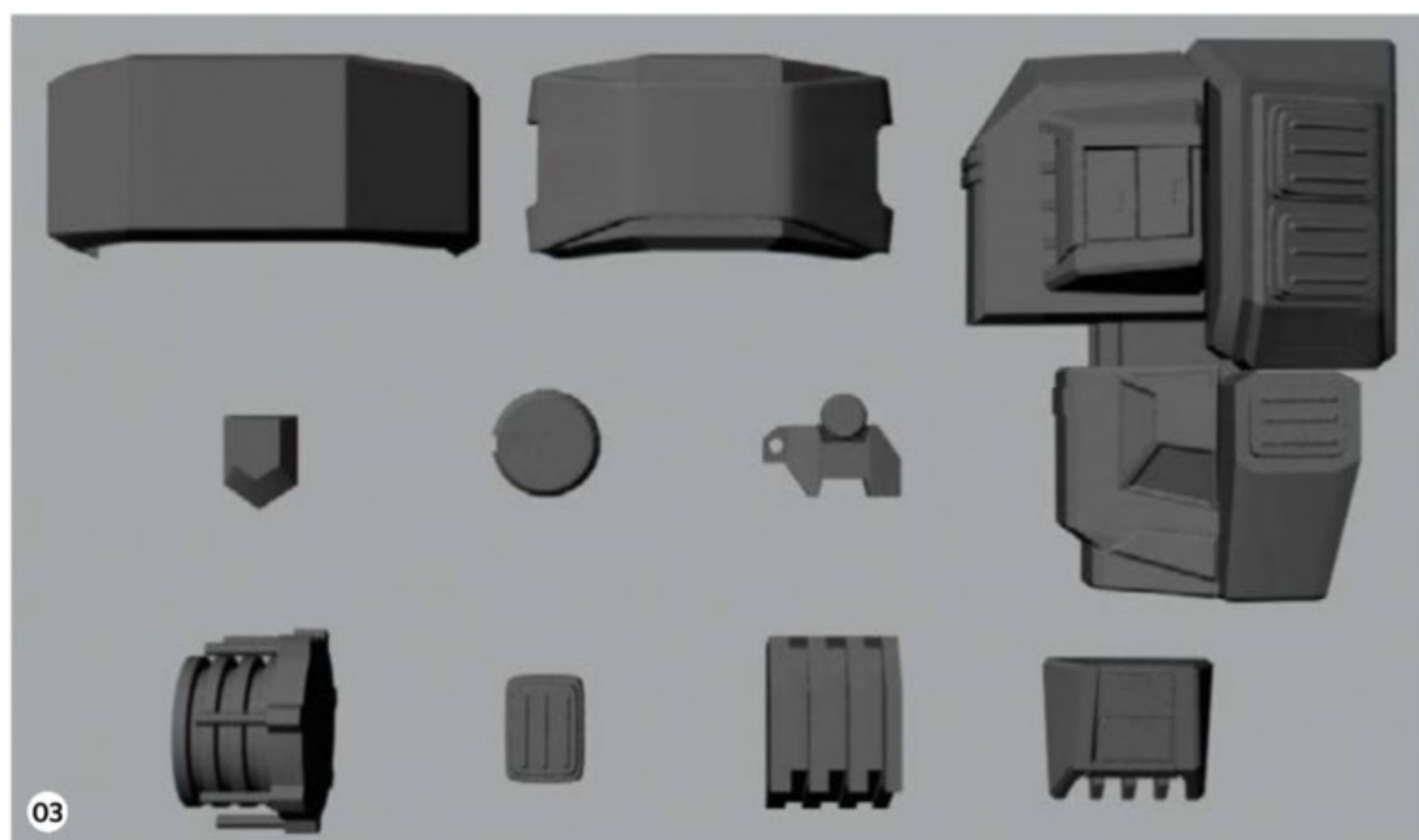
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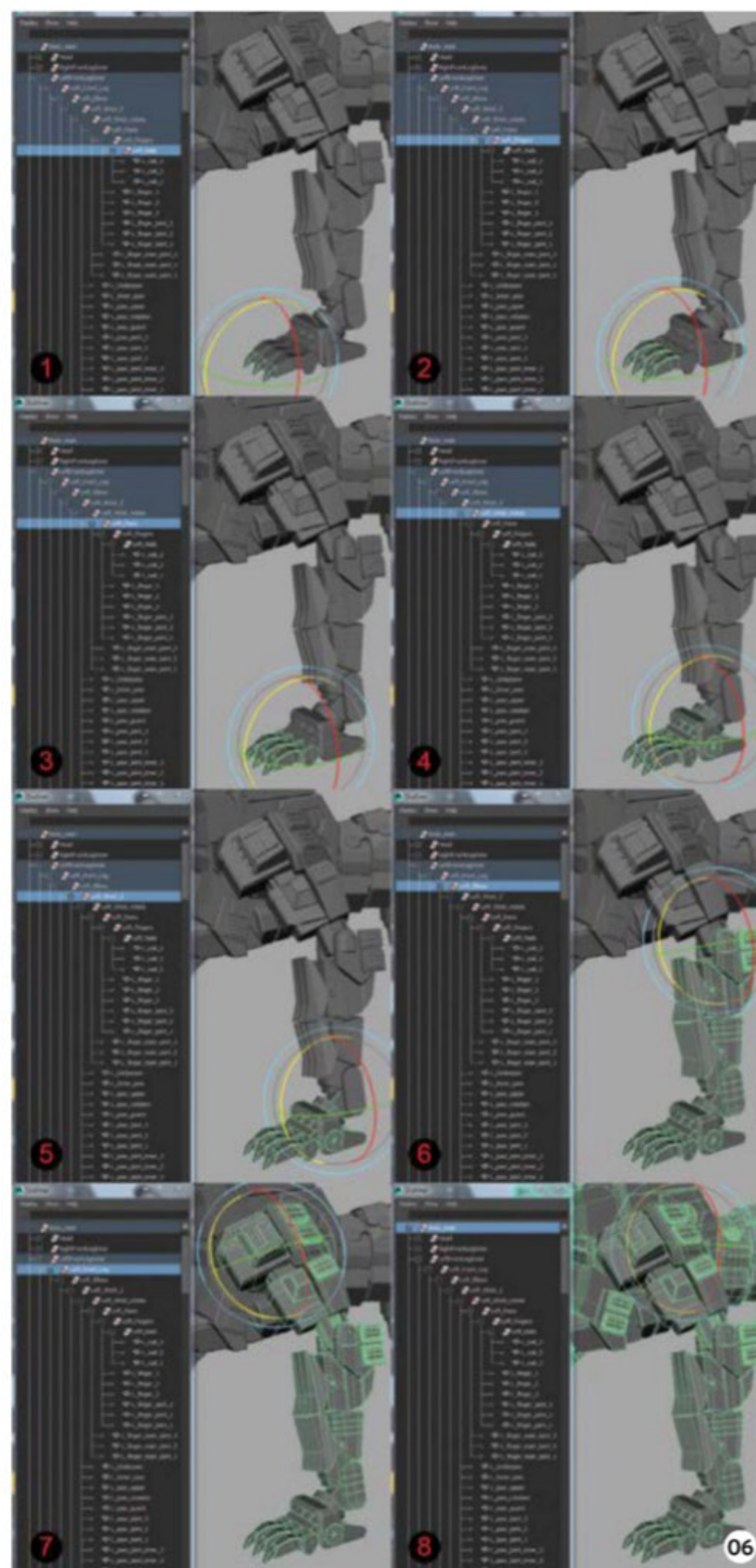
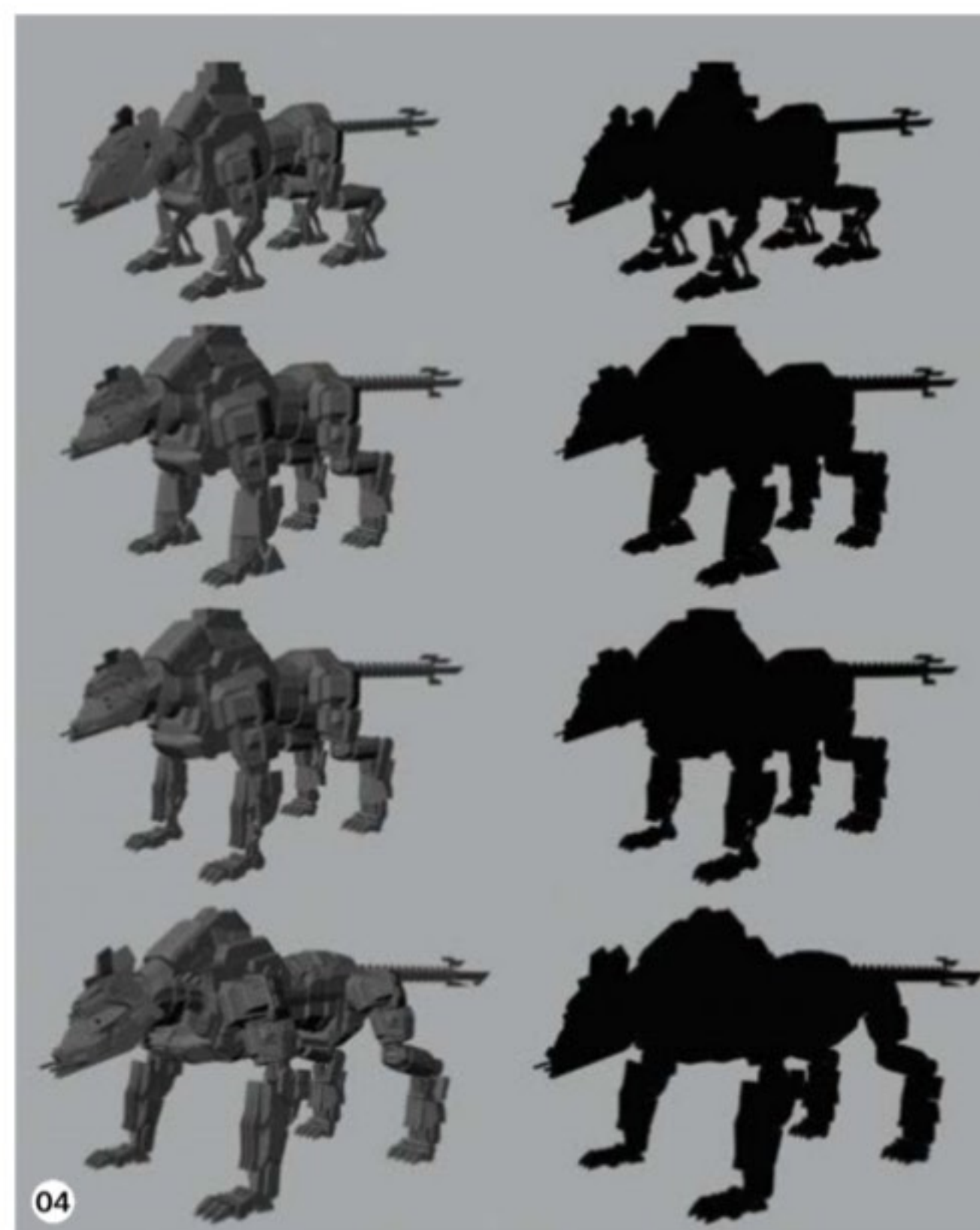
03 Time-saving techniques Sometimes it's not necessary for every piece of the model to be a new object. Be aware of which objects have symmetry, as it's possible to save time by building half of the mesh and mirroring the other half. Some objects can utilise Maya's Duplicate Special command to create complex shapes. Kitbashing is another great method that is widely used to fill your model with details without wasting too much time.

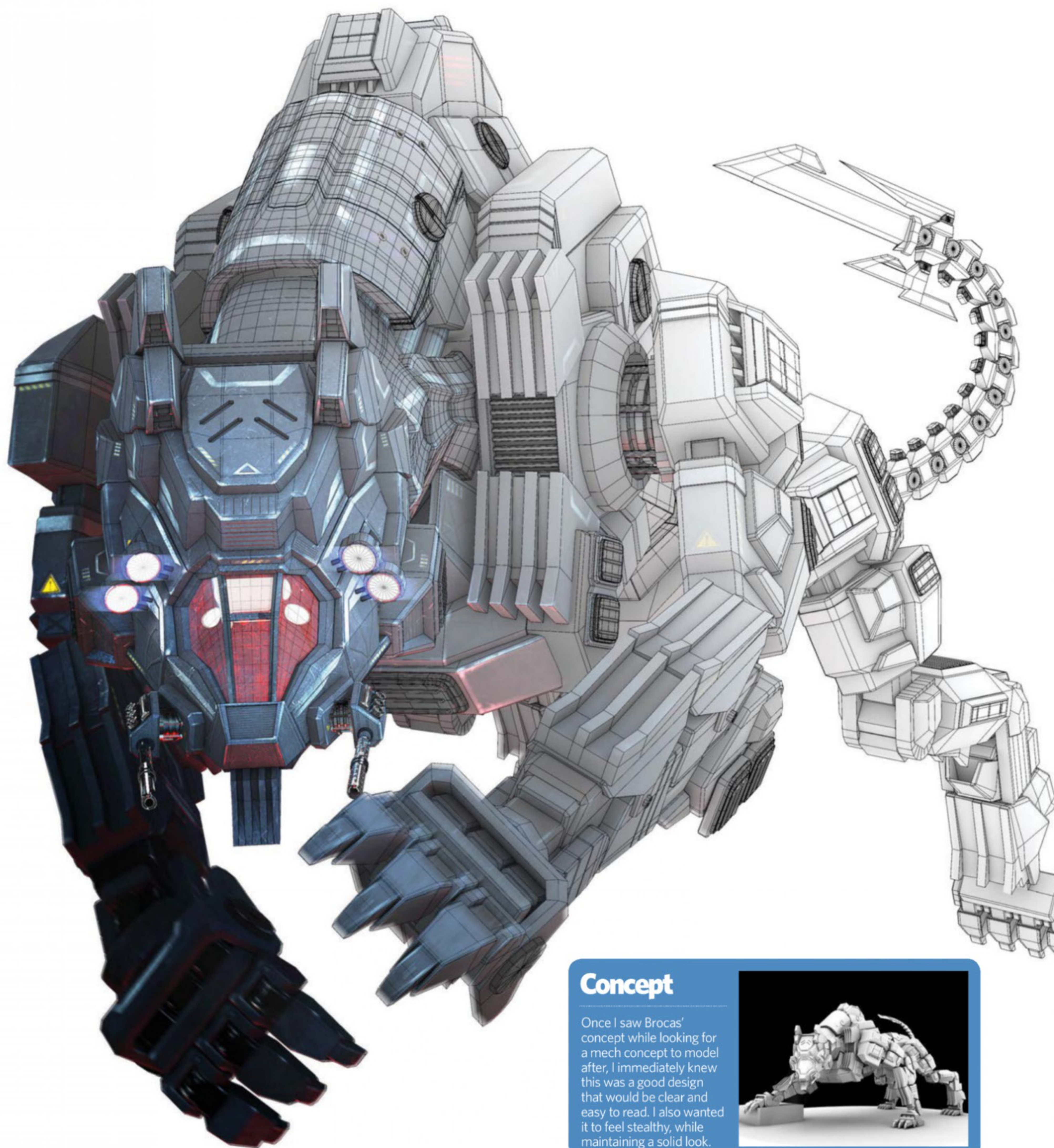
04 Compare and contrast Here we'll begin by blocking in very rough forms, constantly checking the silhouette while building detail. In the early stages it won't look anywhere near finished, so just experiment on different mechanics for the legs. A lot of the time, the model won't look that good in the first few stages, so it's important to be patient and to persevere. Constantly critique the model or ask for other people's opinions. Don't get too caught up on details early on – the silhouette is the first thing that will catch the eye before anything else.



05 Build the head The head will be the hardest to make because it's the most important part to get right – it's the focal point of the model, after all. When modelling, imagine it as a real object. Pieces that are soldered on should be a single mesh and things like nuts, bolts and wires should remain separate. Some hard edges can be combined objects if the weld is too small to be seen, or to save polygons.

06 Group and name objects When dealing with so many of objects, it's imperative to name the objects according to their association. This will aid in organisation going down the pipeline. Maintaining an appropriate grouping hierarchy will help with rigging or posing later on. Also, ensure the axes of groups or individual moving parts point in the right direction.





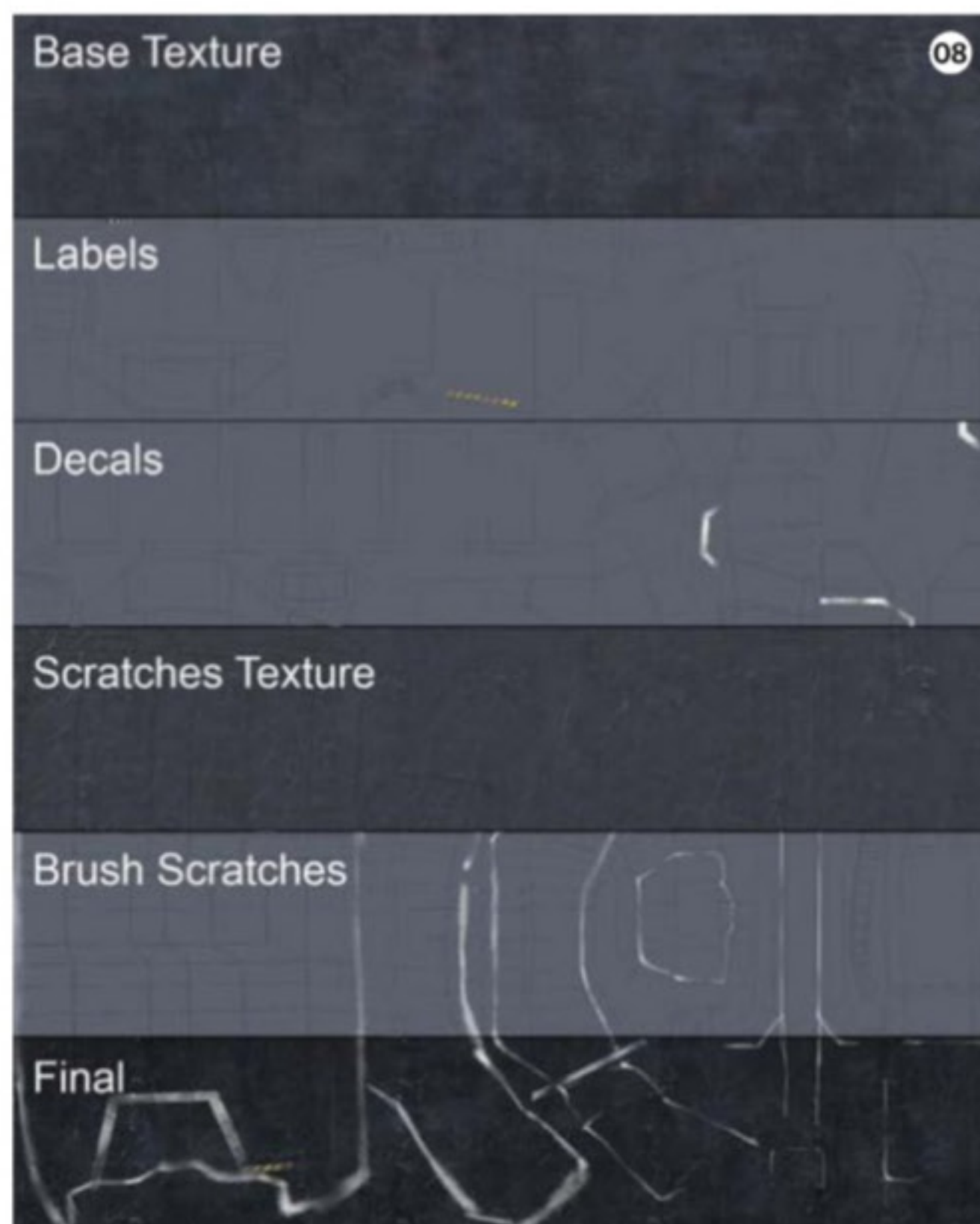
Concept

Once I saw Brocas' concept while looking for a mech concept to model after, I immediately knew this was a good design that would be clear and easy to read. I also wanted it to feel stealthy, while maintaining a solid look.

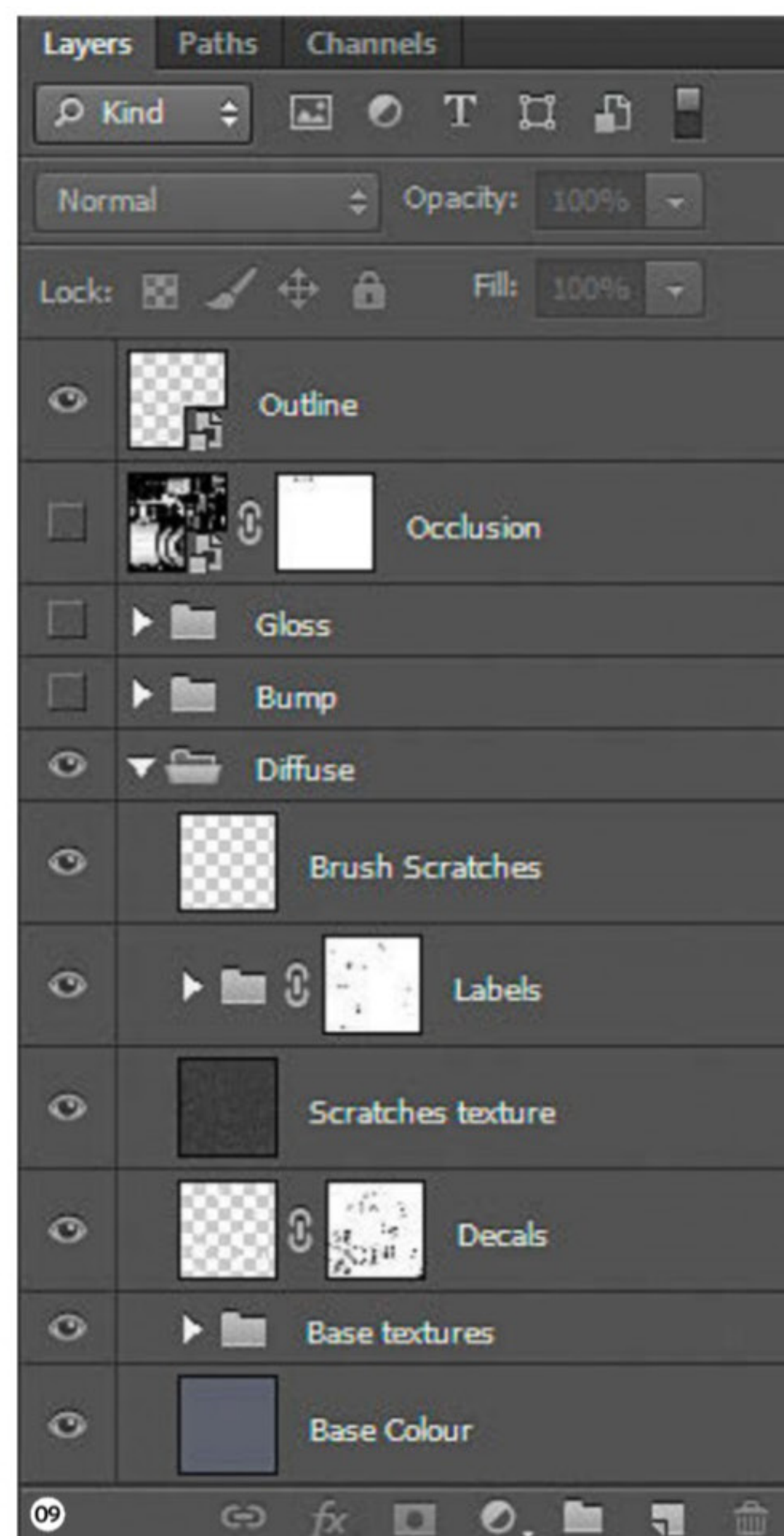


The studio • Build your own creature mech

07 UV unwrap UV guide textures can be very helpful to maintain an evenly sized UV overall, or to help see where to focus detail on. Your UV space is very important, especially if you're working on game models. It's important that once you reach the UV stage, you delete faces that are not seen and reuse or mirror UVs whenever possible. Prioritise UV space for more-visible objects. Understanding the distance you want to view your model from is also important, as it helps define how large you want your textures to be.



08 Create textures When creating textures, it's important to ask the five Ws – who, where, when, what, why – for any creation. For this project, create a base texture made up of photos of metal – www.cgtextures.com is free to sign up and has some good textures. Then look at construction vehicles and machines to find labels that can add to the small details. Some custom decals can go a long way, depending on your project. Next, apply textured scratches for a more-realistic result. For the corners, I prefer to manually paint it in. It's important to constantly go back to your model to check where the scratches should be more evident.

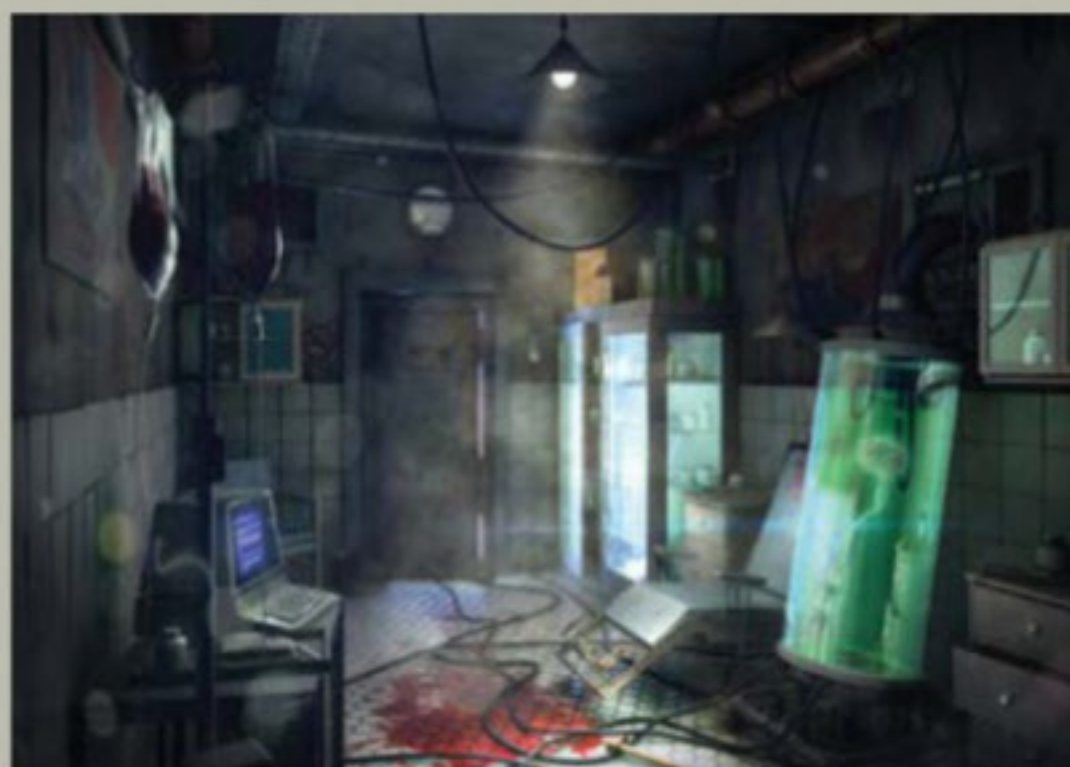


09 Stay organised Keep your Photoshop layers as organised as possible and ensure that they are named appropriately with proper masks. This way you can easily utilise the Diffuse textures, to be applied with other maps. Use non-destructive methods, such as masking and grouping, instead of using the Eraser tool or deleting aspects. This has saved me so many times when unexpected changes to the textures needed to be made.

Artist Showcase

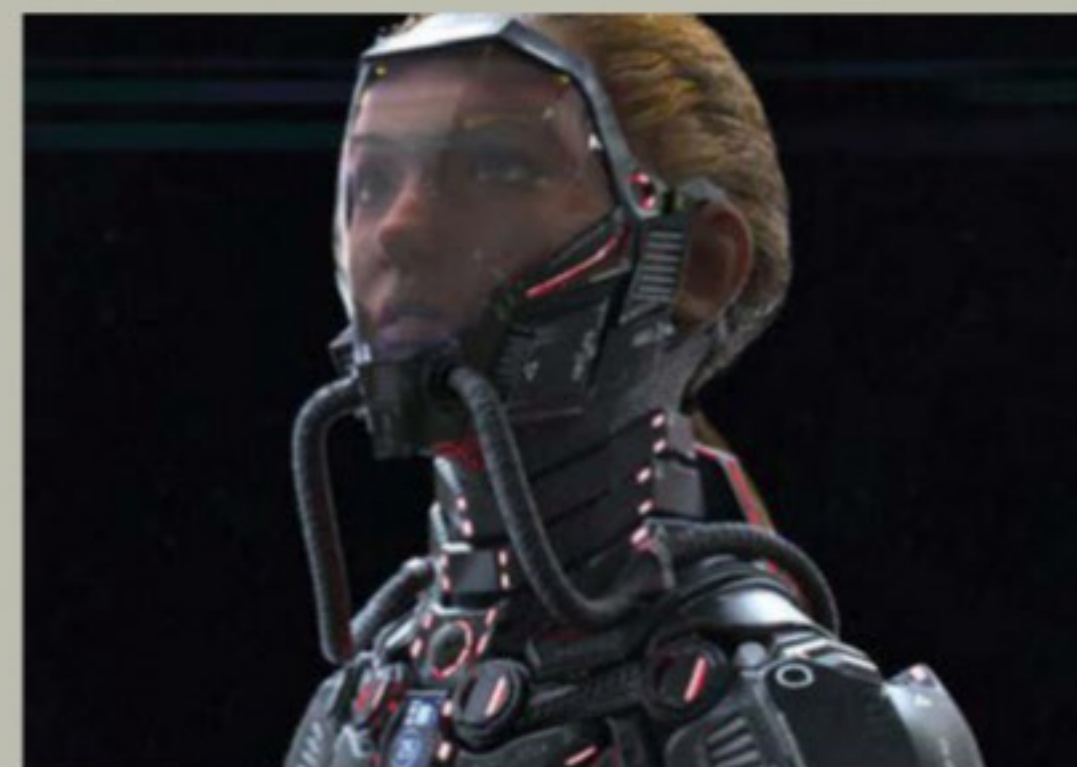
Ng Jian Han

I'm a part-time freelance modeller specialising in modelling, texturing and compositing. I love everything to do with CG, from modelling to animation and VFX. I'm interested in learning new software and techniques, as well as keeping myself up-to-date with new technology. I enjoy filling my spare time with photography, reading, sketching and playing the guitar.



Resonance Maya, Photoshop, mental ray (2013)

This project was created last year as an indoor environment study and practise.



Onward ZBrush, Maya, Photoshop, KeyShot (2014)

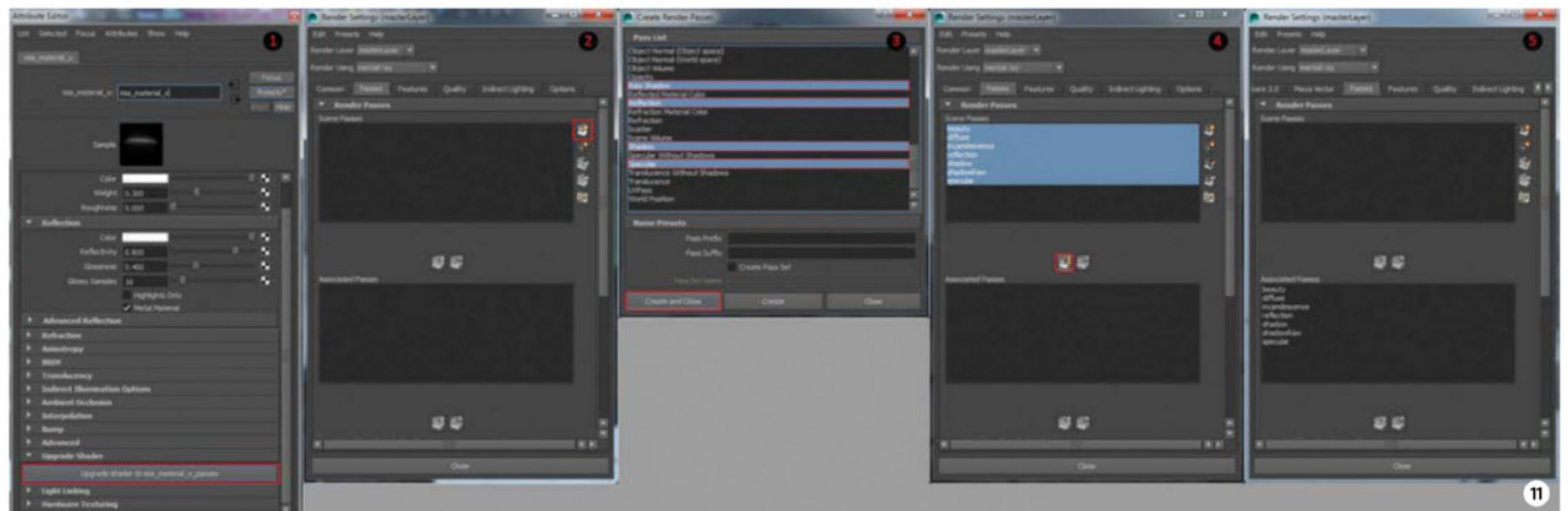
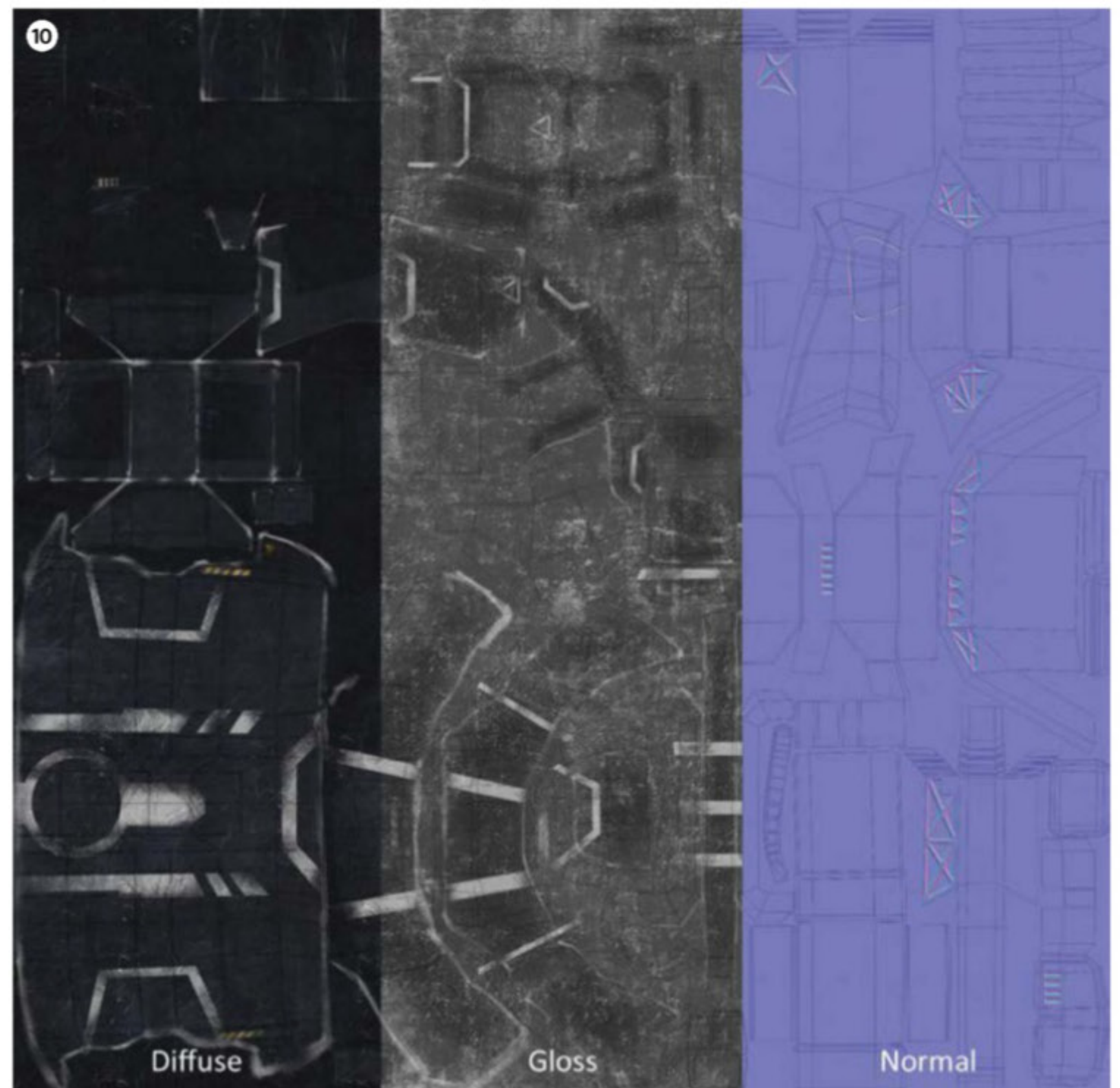
A sci-fi female character is the standard rite of passage for any would-be sci-fi modeller!

10 Utilise key texture maps What can usually make, break, or save your model is texture, and how you apply it. Using the five Ws and references, you can create convincing models with good textures. Most of the time, texture is the storytelling element of the model. It can describe where it has been by the scratches, decals and it also adds tremendous detail without compromising on polygon limit.

11 Take advantage of mental ray's passes Sometimes it can be faster and less hectic to use mental ray's passes rather than the traditional render layers. Mental ray's mia_material_x can be upgraded to mia_material_x_passes to be used in mental ray's Render Passes feature under Render Settings. First, upgrade the Shader to mia_material_x_passes in the Upgrade Shader attribute, then press Create New Render Passes in the Passes menu in the Render Settings. Select the passes you want and hit Create and Close.

3 steps for realistic renders

1. Physically accurate materials - mia_material_x is a great one, simulating real-life absorption, reflection and transmission.
2. A linear workflow - This ensures that your renders are displaying Maya's renders accurately.
3. Use Quadratic Decay in your lighting - This emulates physically accurate light. You'll normally have to crank up the Intensity into the thousands. Keep in mind that having both physically accurate materials and Quadratic Decay on will increase your render time.



Gladiator ZBrush, Maya, Photoshop, Quixel Suite, KeyShot (2014)

A character created as a practise for when making characters for short films.



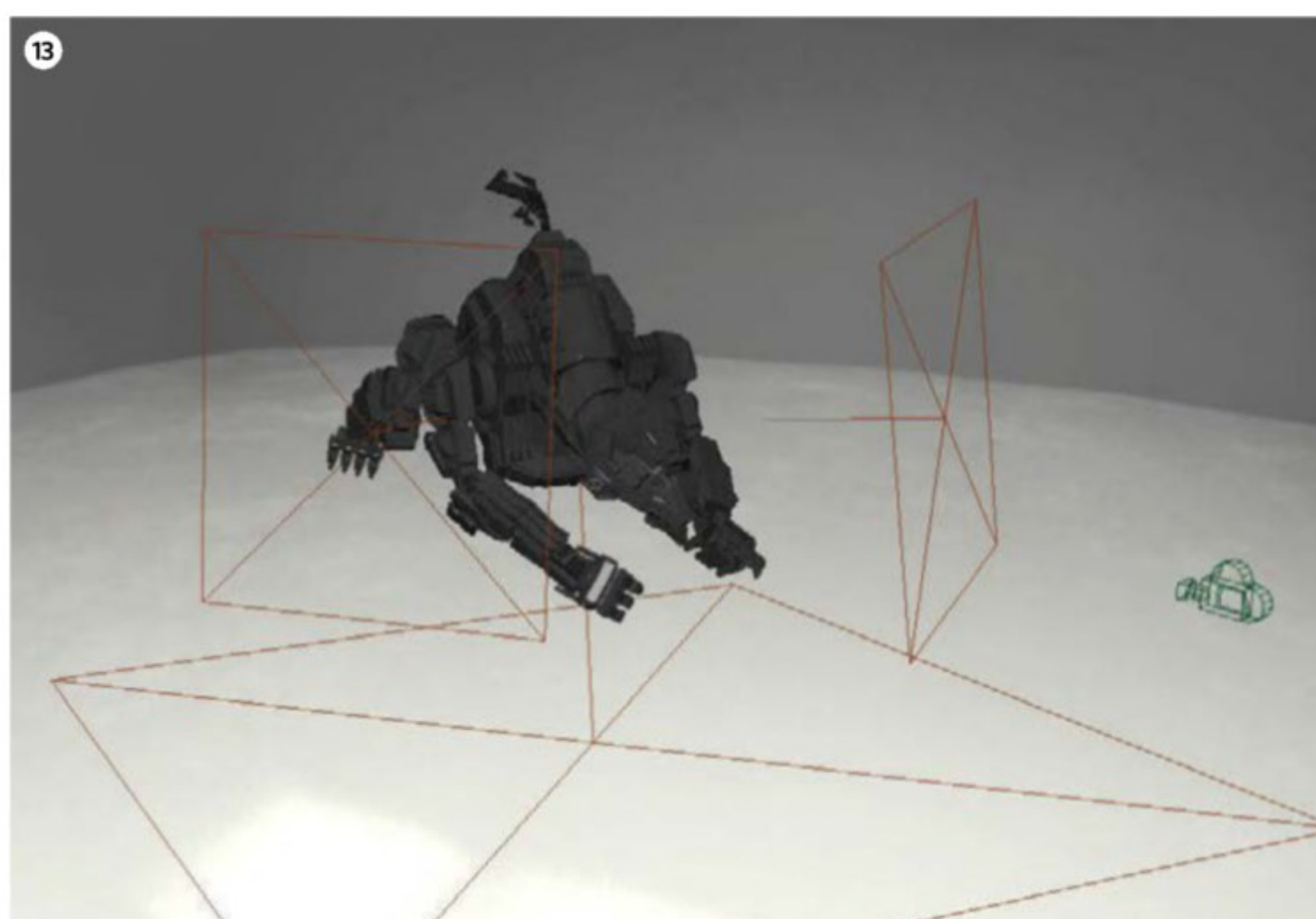
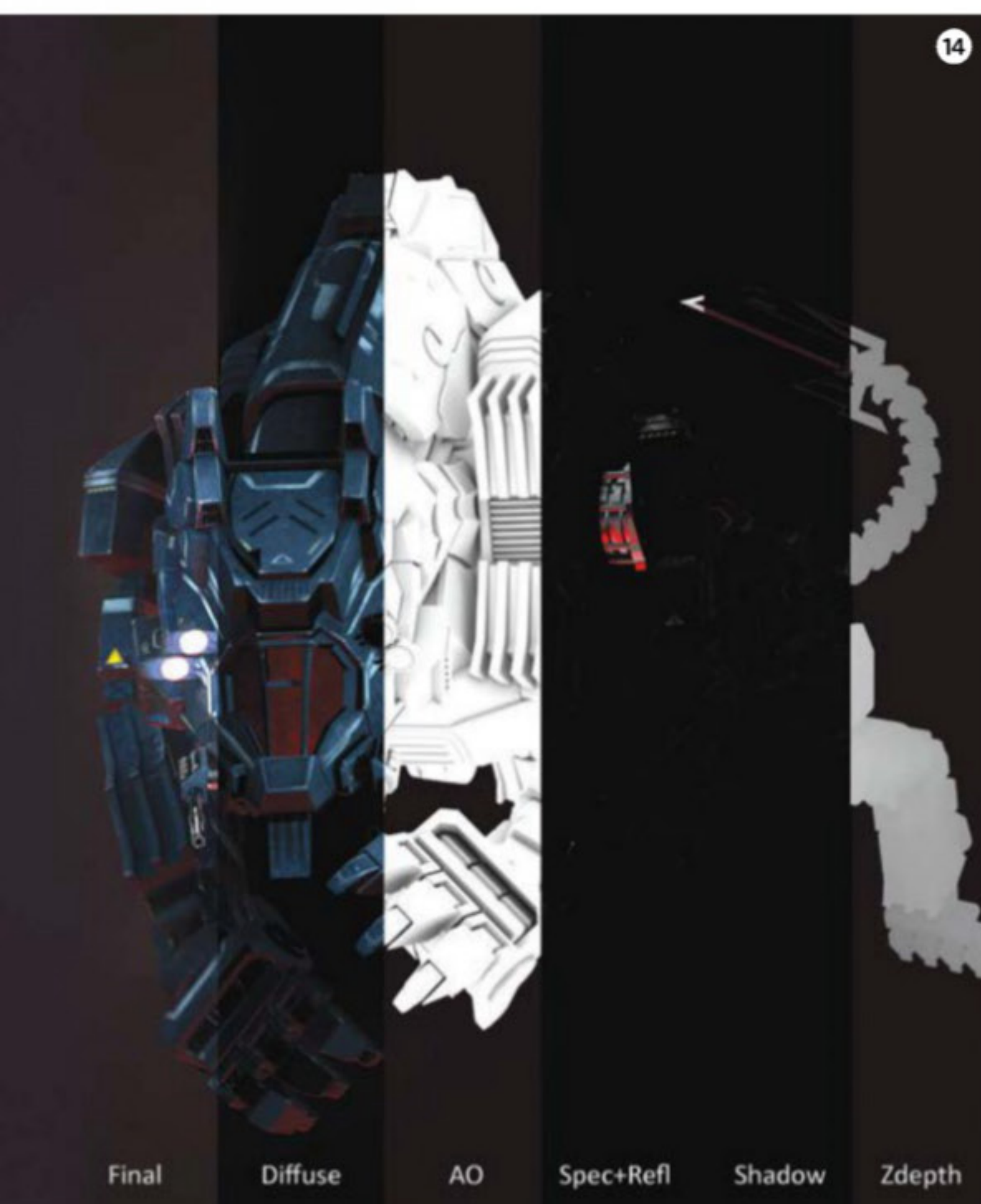
© Joe McDonald,
McDonald Wildlife
Photography
www.hoothollow.com

12 Gather references for posing

It can be tempting to jump straight into posing, but going back to real-life references always creates the best, most-accurate results. Sometimes sketching silhouettes can also be helpful if gathering references is difficult. In this project, I searched for poses of tigers and came upon one that I really liked. I followed it as closely as I could, and then made changes because of the model's limitations and different proportions.

The studio • Build your own creature mech

13 Light the model Usually a simple three-point lighting setup can go a long way. To get the most realistic lighting, set the light's Decay Rate to Quadratic. This means the Intensity must be bumped into the thousands. The render time will increase, but the results are better. Be aware of the focal length of your camera – this can drastically change how your model looks, especially up close. Lower focal lengths can distort how your model looks, whereas higher focal lengths may create a flatter appearance.



14 Composite the image Maya's default render output is good, but definitely not enough. Using render passes will save time instead of having to constantly change the lighting and settings to get the perfect render. In Photoshop, apply your Ambient Occlusion as Multiply, while Specular/Reflection should be set to Screen, Colour Dodge or Linear Dodge. Set Shadow as Multiply, Colour Burn or Linear Burn. Apply Z-Depth in Filter>Blur>Lens Blur.

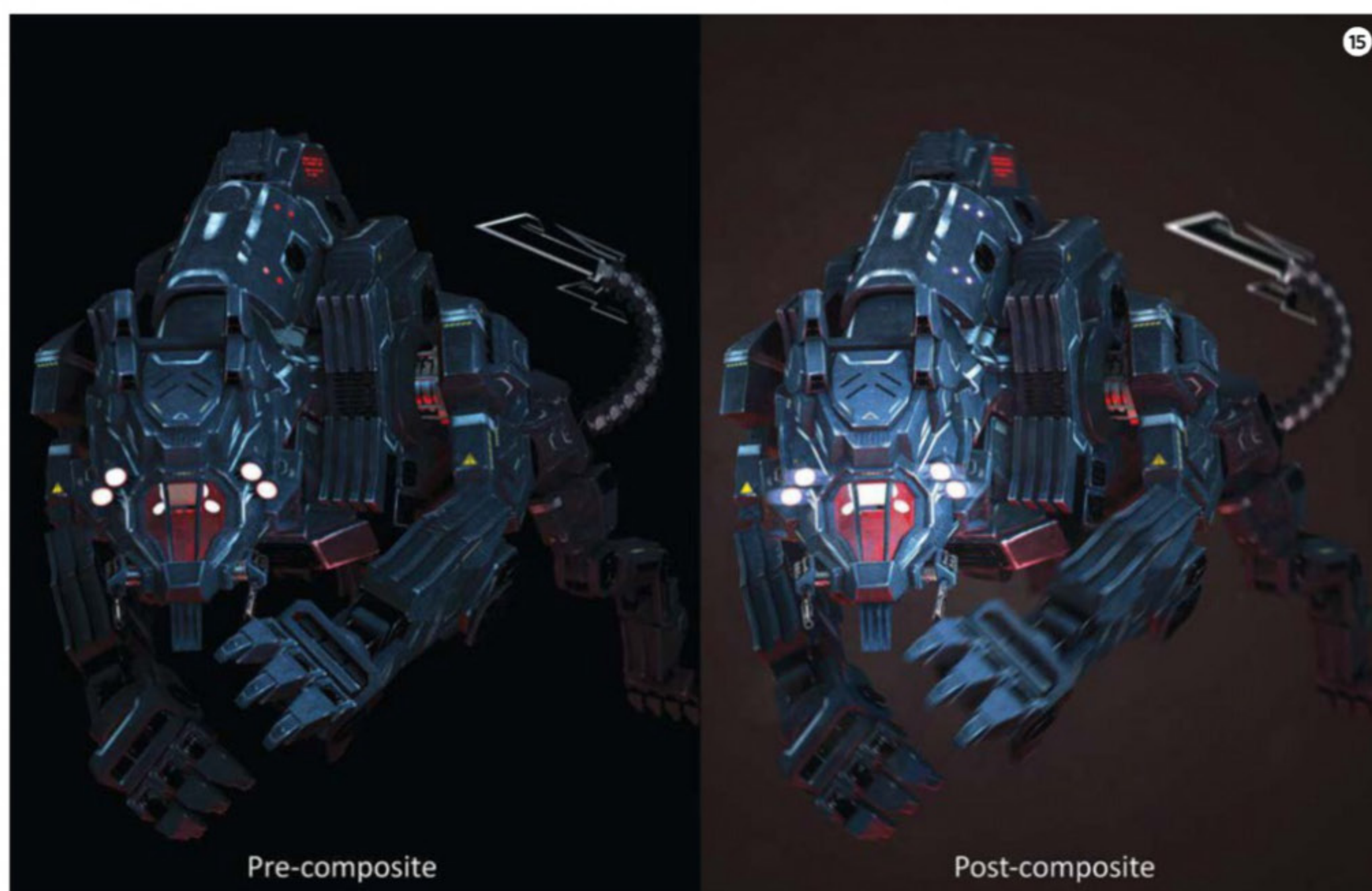
15 Add any final elements Here you can see the difference between pre-compositing and post, and its benefits. These are a few of my favourite tools in Photoshop, which are easy to use and can enhance the final composite:

Levels, curves and exposure – These tools help to manipulate tones. Having a side-by-side greyscale copy of your render can help to focus on the composite's values, while not being distracted by the colours.

Hue/saturation and colour balance – These tools can drastically change the mood and enhance the impact of colour of the composition.

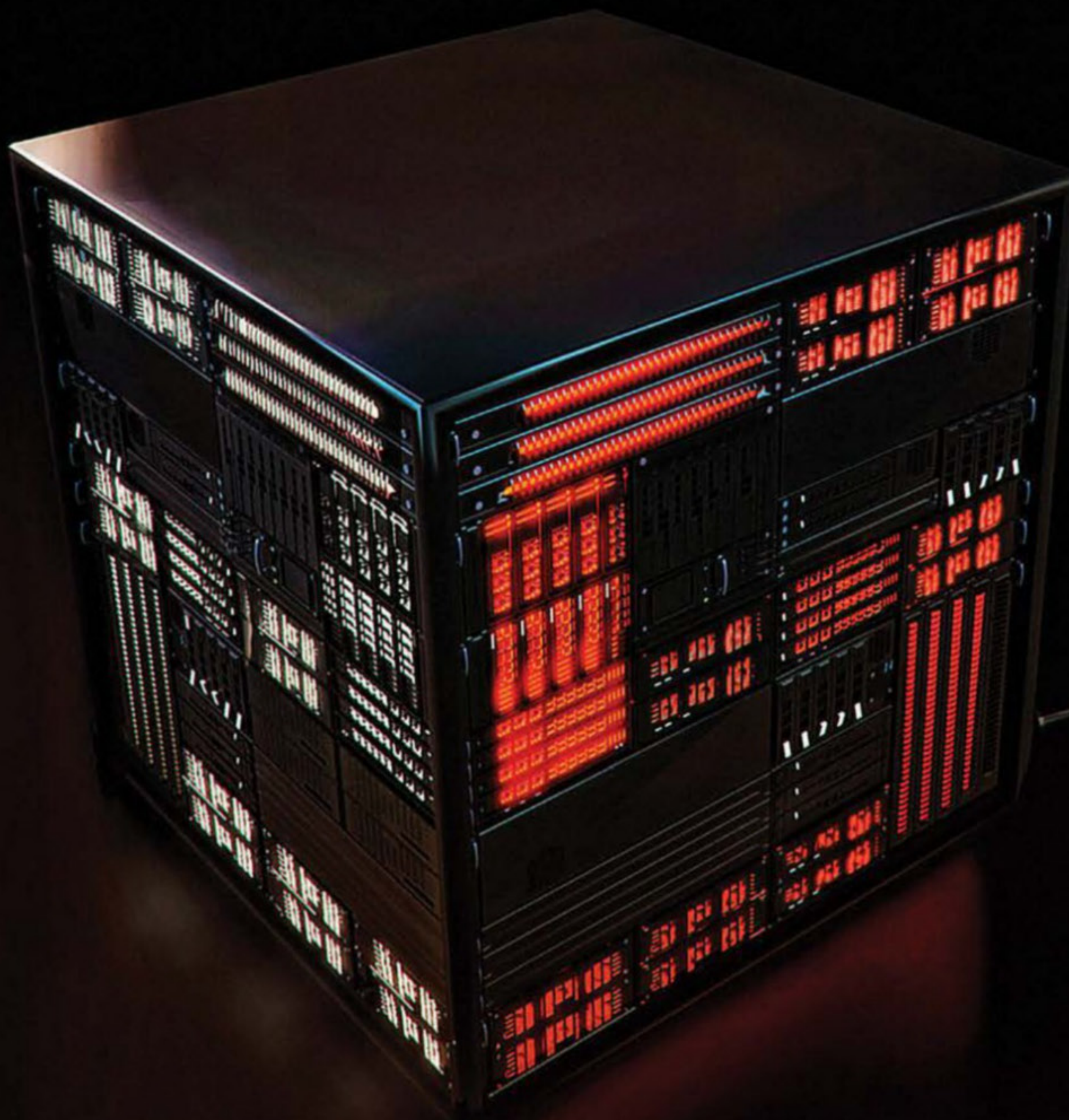
Motion blur – This is a tool that can really bring the composition to life.

Sharpen – When done right, sharpening an image can make it really stand out. Don't be tempted to overuse it though, as less is more!



Don't lose heart

Patience and perseverance are very important when modelling, especially on an unfamiliar project. There will always be a big temptation to drop the project and start on a new one. Don't worry – constantly work on it until it is as close to or better than the final result that you imagined before you began. Once you're done, do it again, only faster. There are tons of tutorials and resources available on www.3dartistonline.com and elsewhere. So don't stop when you don't understand something, but rather, try to overcome it through research, study, and lots of practise!



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CGI ILLUSTRATION BY SANDERS.SHIERS

Technique focus

Incredible 3D artists take us behind their artwork

DETAILING Of all the techniques I use while working, the one that helped me the most was the Blend If sliders in the Blending Options within the Layer Style window. This enables you to control which parts of the layer you want hidden. For instance, if you want to hide the darker parts of your layer, slide the black levels towards white and they'll disappear. **Moonlit Serenade**, 2014



Bobby Myers

Website www.bobbymyersart.com

Country USA

Software used Maya, Terragen, Photoshop

Bio Bobby is a self-taught digital artist specialising in digital matte painting and environment design

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Step by step

Easy-to-follow guides take you from concept to the final render



Sérgio Merêces

3DArtistOnline

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Personal portfolio site
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Country Portugal

Software used 3ds Max,
Octane Render, Photoshop

Expertise Sérgio specialises in
lighting, rendering and
post-production in Photoshop

Rebuild the Taj Mahal

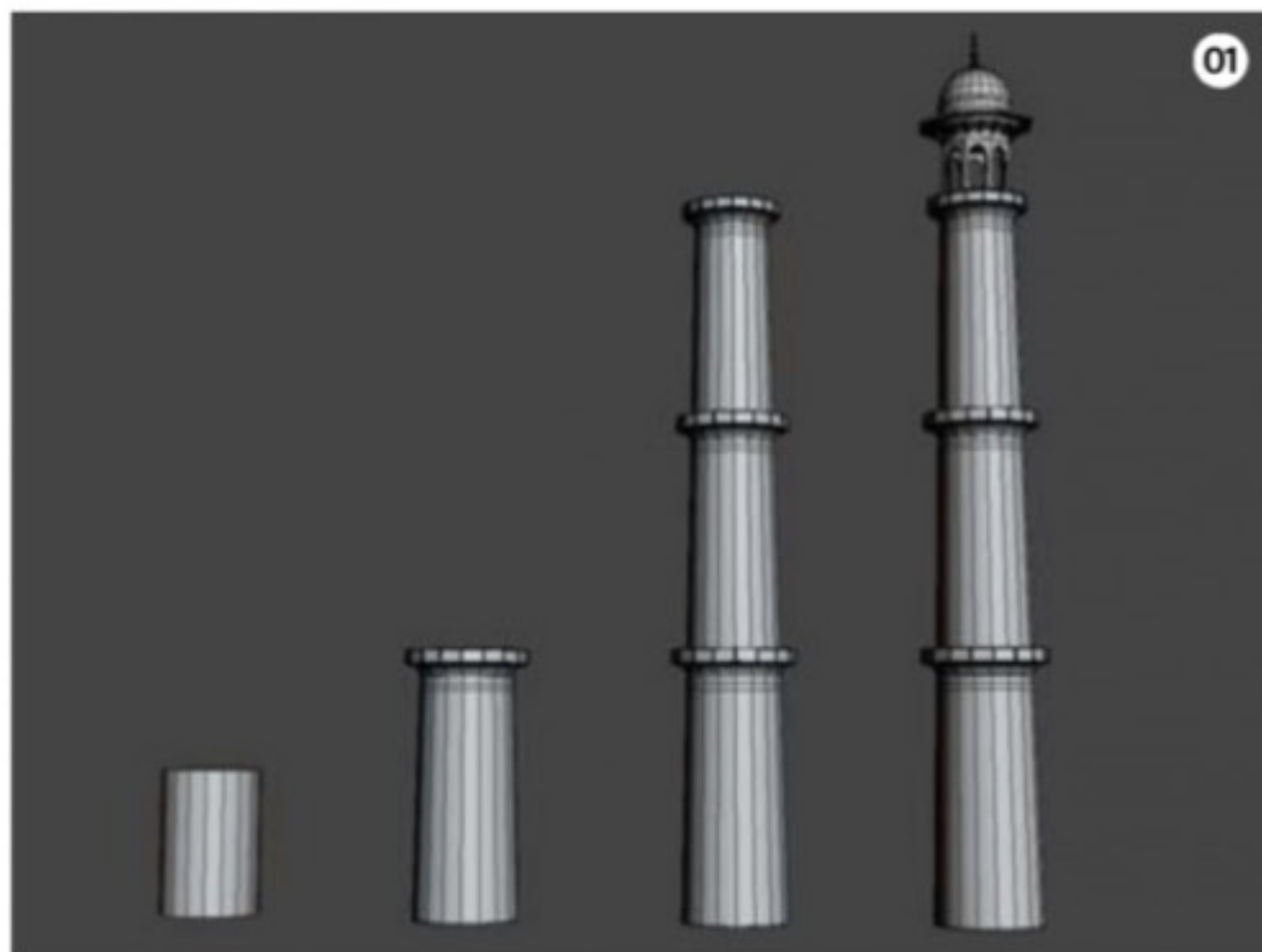
Taj Mahal 2014

“In this tutorial we’ll learn how to re-create iconic landmarks in 3D, with a focus on lighting and setting the scene’s environment”

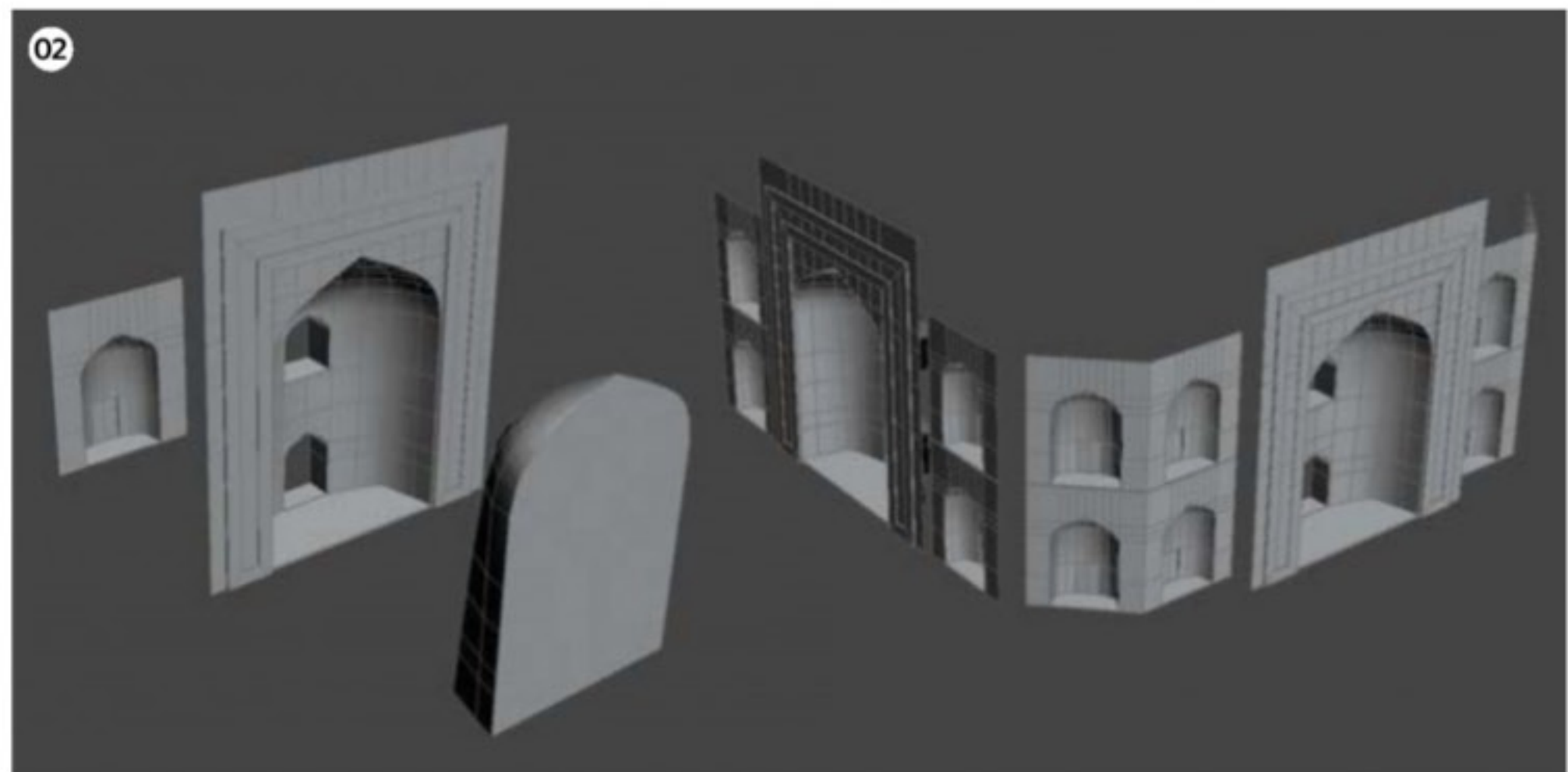
Sérgio Merêces is a professional 3D artist who provides 3D visualisations to clients around the world

Re-creating iconic architecture can be a tricky thing to master, and in these steps I will cover rebuilding the Taj Mahal in 3D. We will begin with the modelling process of the scene and the creation of materials for the model. We will also take a look at how to cover the lighting setup using an HDRI map and eventually using the Octane Render engine to render our final image.

You will need to consider how to use the Forest Pack plug-in to create all of the vegetation for the scene. Last of all, I will share the post-production steps that I follow to give the raw render its final tone and atmosphere, predominantly using Photoshop filters. These will include edits to the Curves, Levels and Gamma menus, as well as tweaks to colour corrections and the use of various plug-ins.



01 Model the towers Let’s begin the modelling process with a 3ds Max Primitive Cylinder. We can then convert it to Edit Poly, where we will begin to adjust the wireframe to achieve the desired shape using the Extrude tool and adjusting the edges and vertices to get the final shape for the towers.



02 Create the facade The Taj Mahal building is quite simple to model because all the other three facades are equal, so you just need to build the front facade and copy it. Begin with a plane and create the entrances with the Boolean tool, combined with other basic models until you get the desired shape. We’ll then need to fix the bad edges and adjust the vertices. After we have the main facade shape, let’s model the details and compose all the parts.

03 Model the finer details When it comes to making the domes, start with Primitive Spheres that are then converted into Edit Poly and modelled with the Extrude tool. Like before, adjust the vertices and Swift Loop edges to get the shape. After we’ve built up the base of the building, start to work on the details using the same techniques (such as Edit Poly, Extrude, Cut tool and adjusting the vertices). This is the basis for all the modelling processes for the Taj Mahal. Obviously it’s important that you use real-world reference images to make sure the model is accurate.

Scripts and plug-ins

3ds Max is a software that gives us a variety of options for scripts and plug-ins to improve our workflow and help speed up processes. In my daily workflow I use a lot of scripts. I can’t list them all, but some of the most useful ones are Outliner, Copitor, RappaTools, Isolation Levels, Clone and Forest Pack. These are simply indispensable, and you can find them online at www.scriptspot.com/3ds-max/scripts.



Learn how to

- ✓ Light a scene
- ✓ Set up materials
- ✓ Use the Forest Pack plug-in

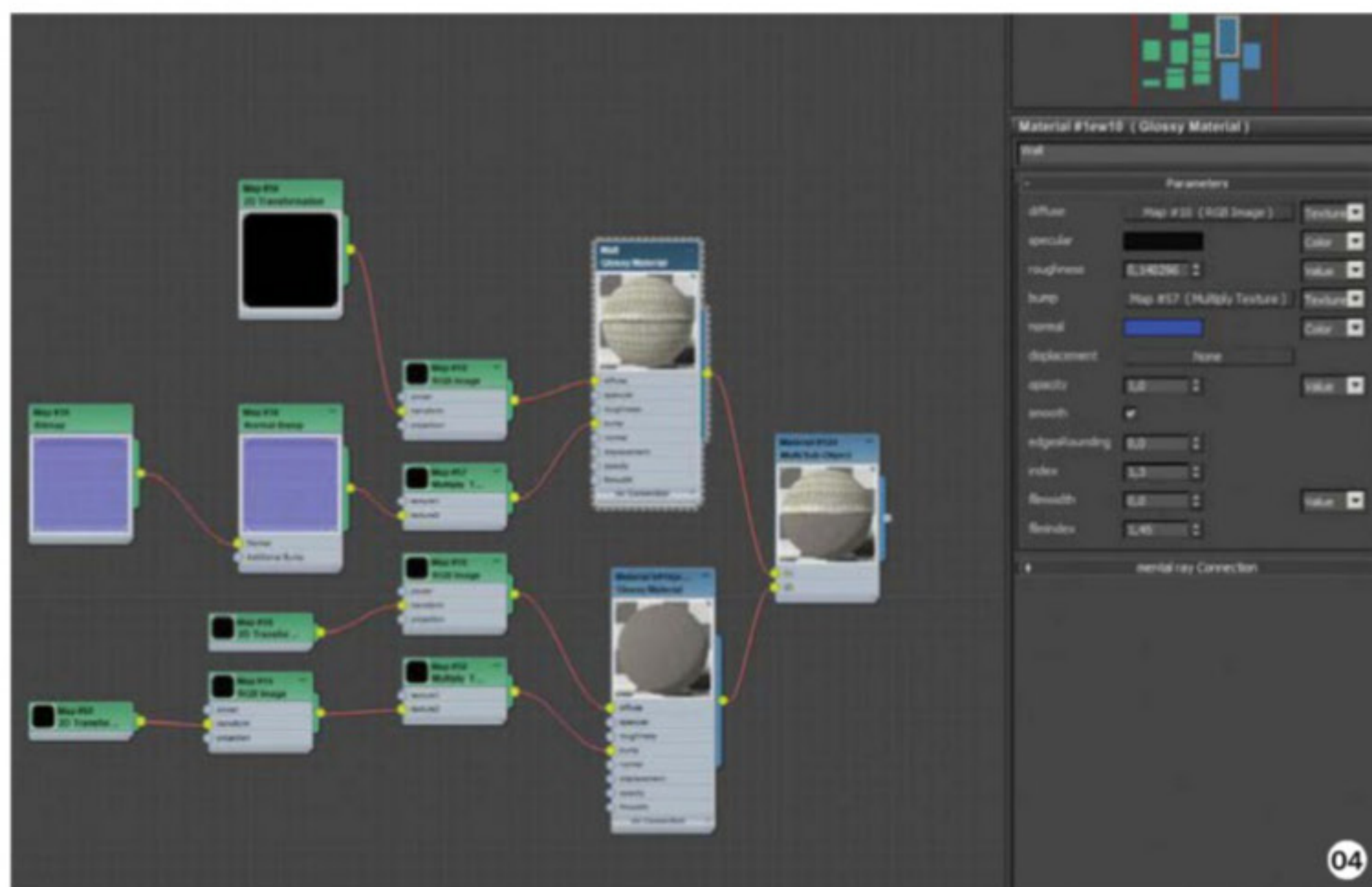
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- Tutorial files:
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The studio • Rebuild the Taj Mahal

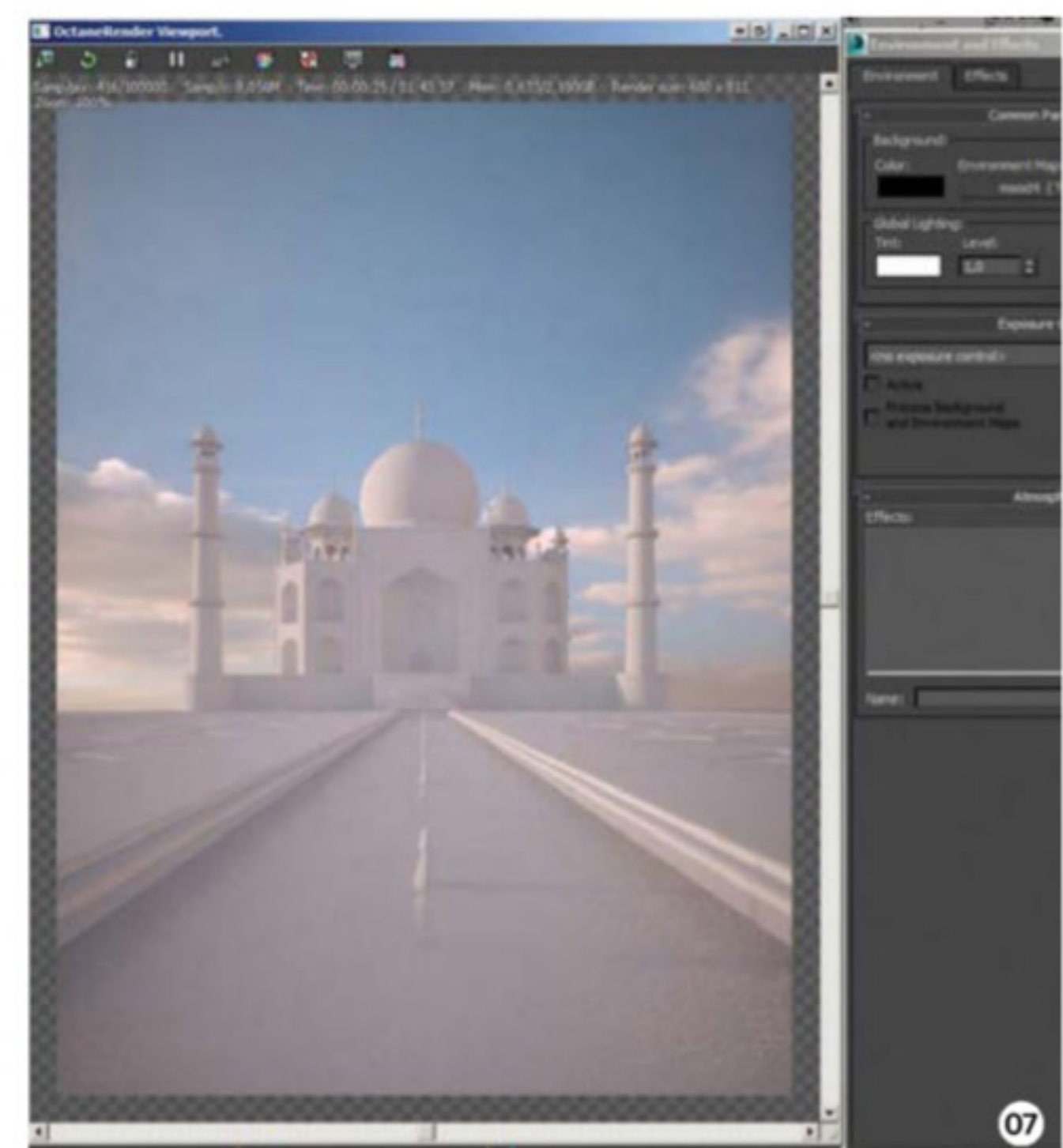
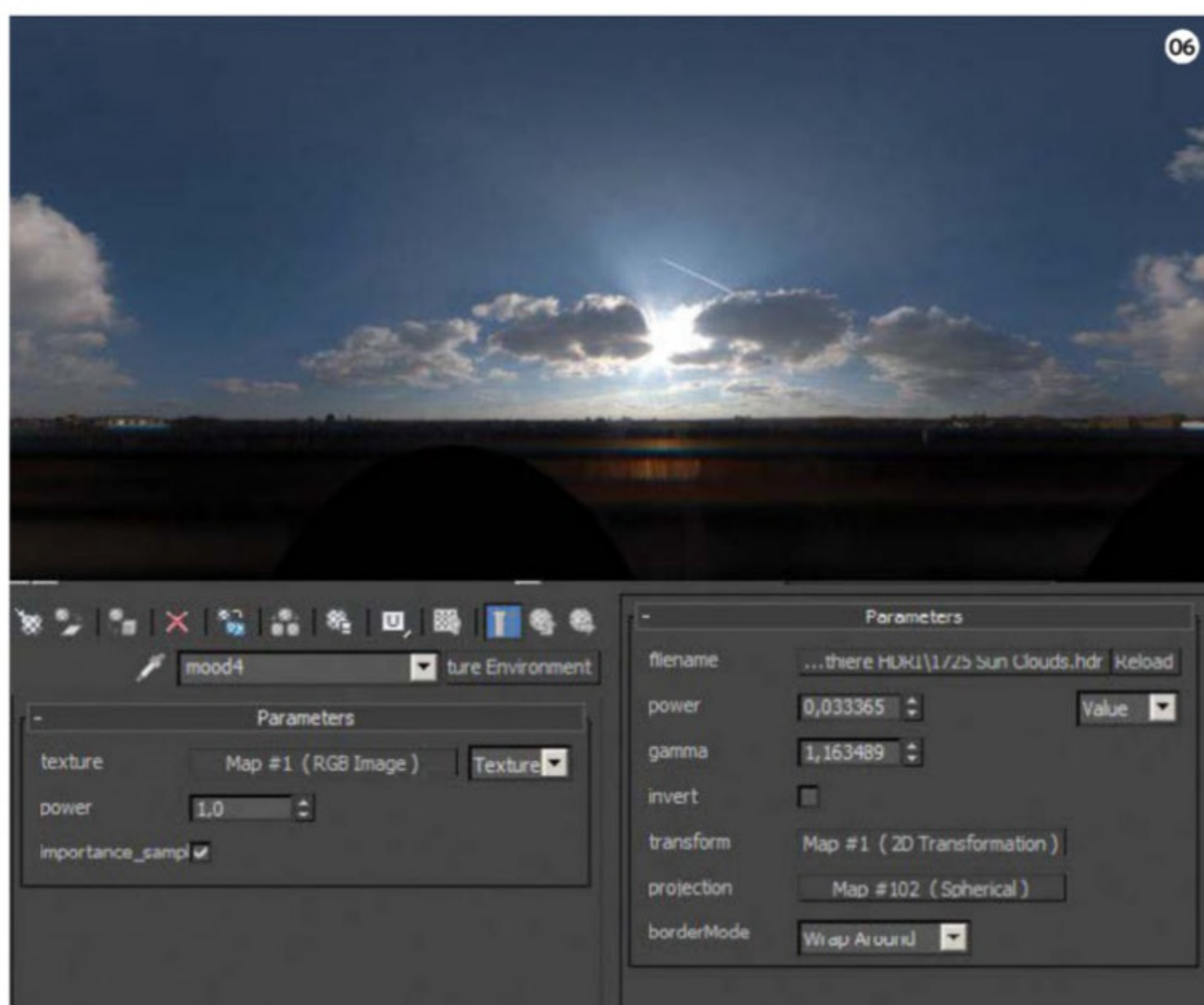
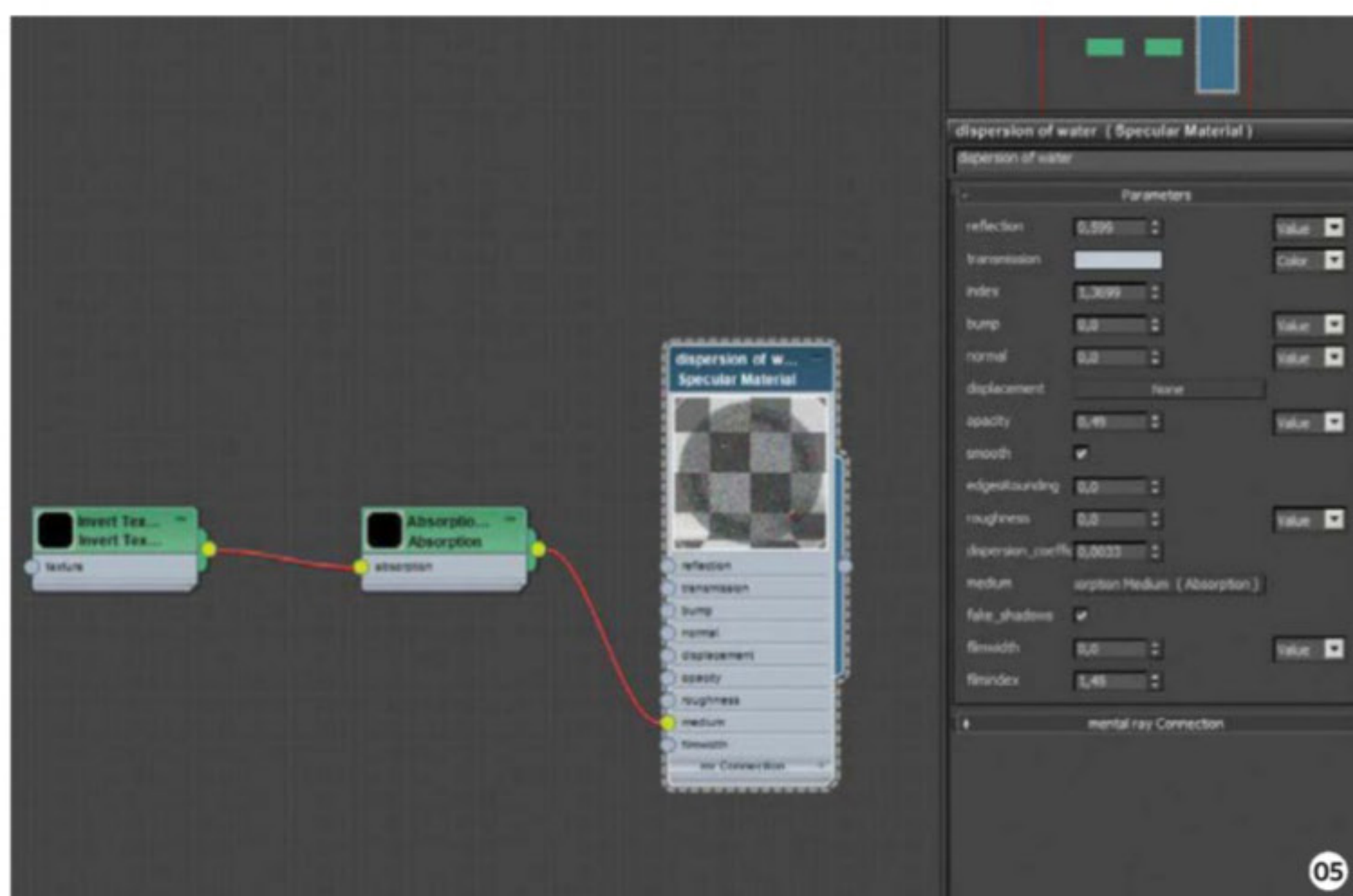


04 Build materials For the building materials, use the same base shader for all the parts, such as walls, ceiling and floor. Create an Octane Glossy material where we can put the Color texture in the Diffuse slot, as well as the Bump map to give the extra detail for the textures.

05 Add water For the water material, create an Octane Specular shader. To get a realistic look, we need to play with the Transmission and Absorption parameters, adding a slight green colour to the Absorption. This is because lake water tends to have a bit of a green-coloured tint as a result of any vegetation, and also because it's stagnant water.

06 HDRI map For most of my work I like to use only an HDRI map for the illumination, as I find that it's a better option to get a really cool illumination for the scene, with better shadows and colour bleeding. Start off by creating an Octane Texture Environment shader. We then need to add it into the Texture slot as an RGB image. Next, choose the HDRI map as the RGB image – for my scene, I chose one from the Peter Guthrie collection, known as 1725 Sun Clouds.

07 Set up the lights To use our HDRI map, we need to open the Texture Environment shader from Octane in 3ds Max's Environment window. Set the Environment Map to Instance, adjust the Power to control the overall scene illumination, then tweak the Gamma settings that will define the sharpness of the shadows and the contrast. Try to achieve a pleasing balance so that the lighting is as realistic as possible.

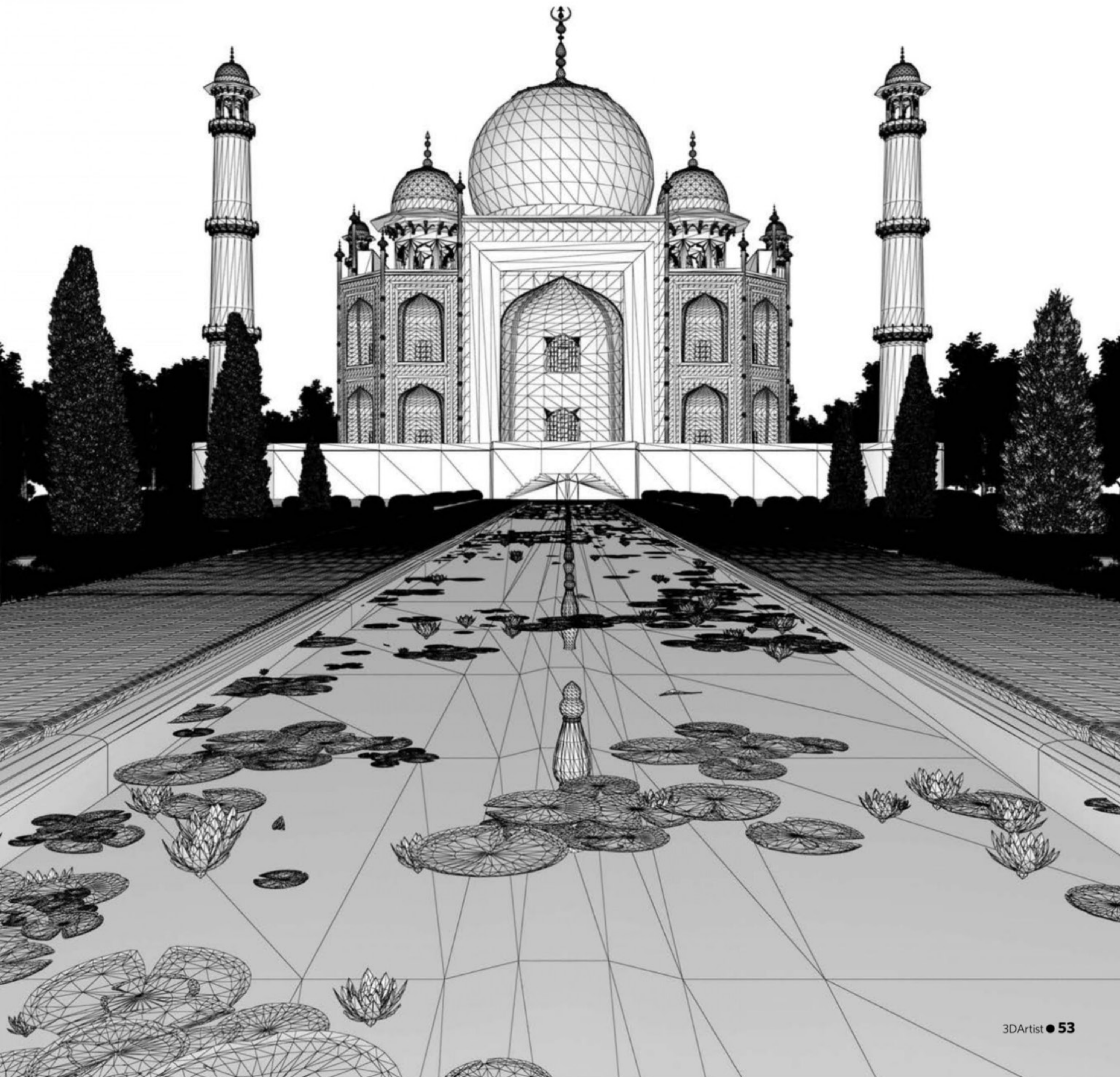


Light tweaking and testing

For me, I find that Octane Render is a great tool to use because it's one of the fastest real-time renders on the market. This gives us an advantage when it comes to setting up our scene and testing the lighting and materials within it. The best way to do this is to put a Material Override across the scene, launch Octane and begin playing with the camera settings and HDRI settings until you get the best illumination that suits your scene. After the lighting is sorted, you just need to begin testing the scene materials and improve them in real-time.

Concept

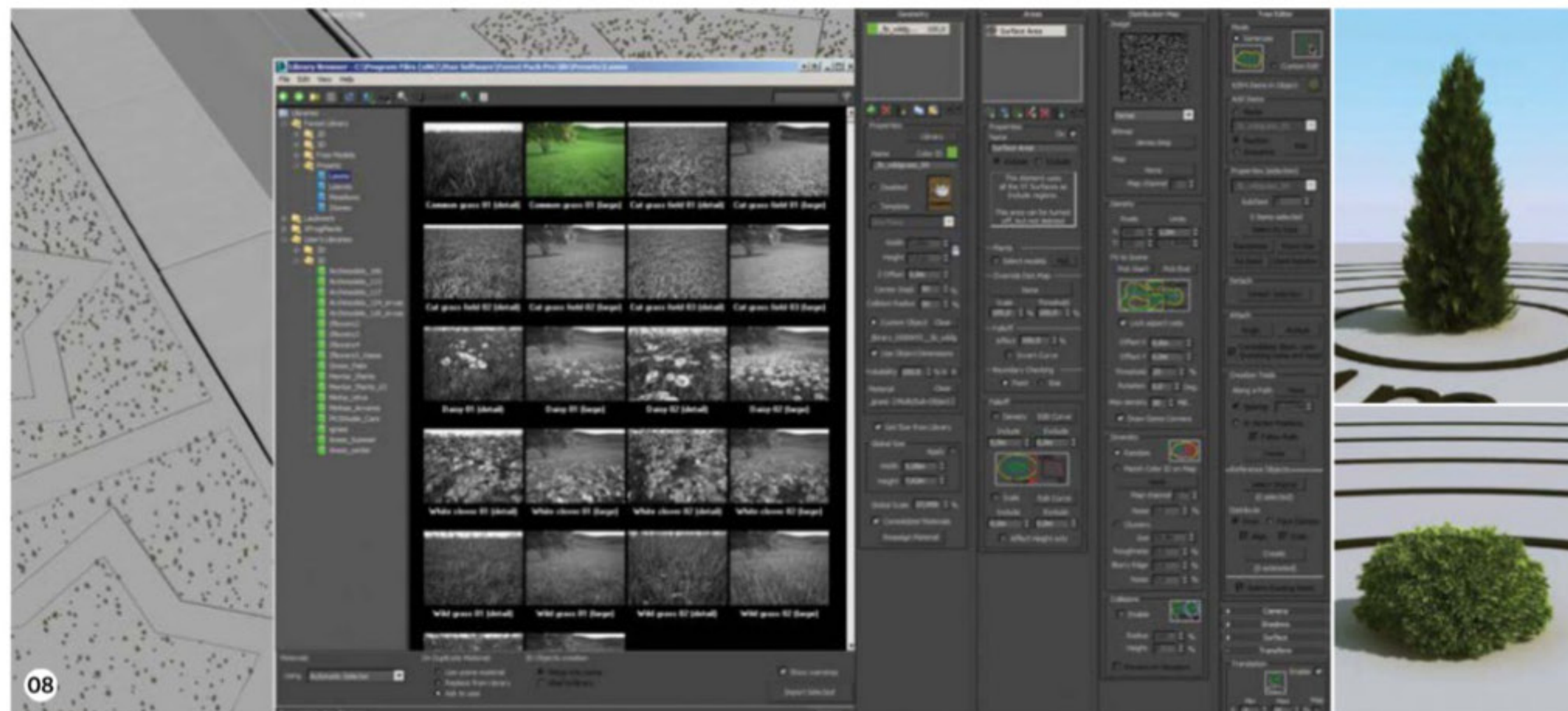
The idea for this design was to create a beautiful rendition of the Taj Mahal. I searched for good references for this work, as well as taking inspiration from real photos.



The studio • Rebuild the Taj Mahal

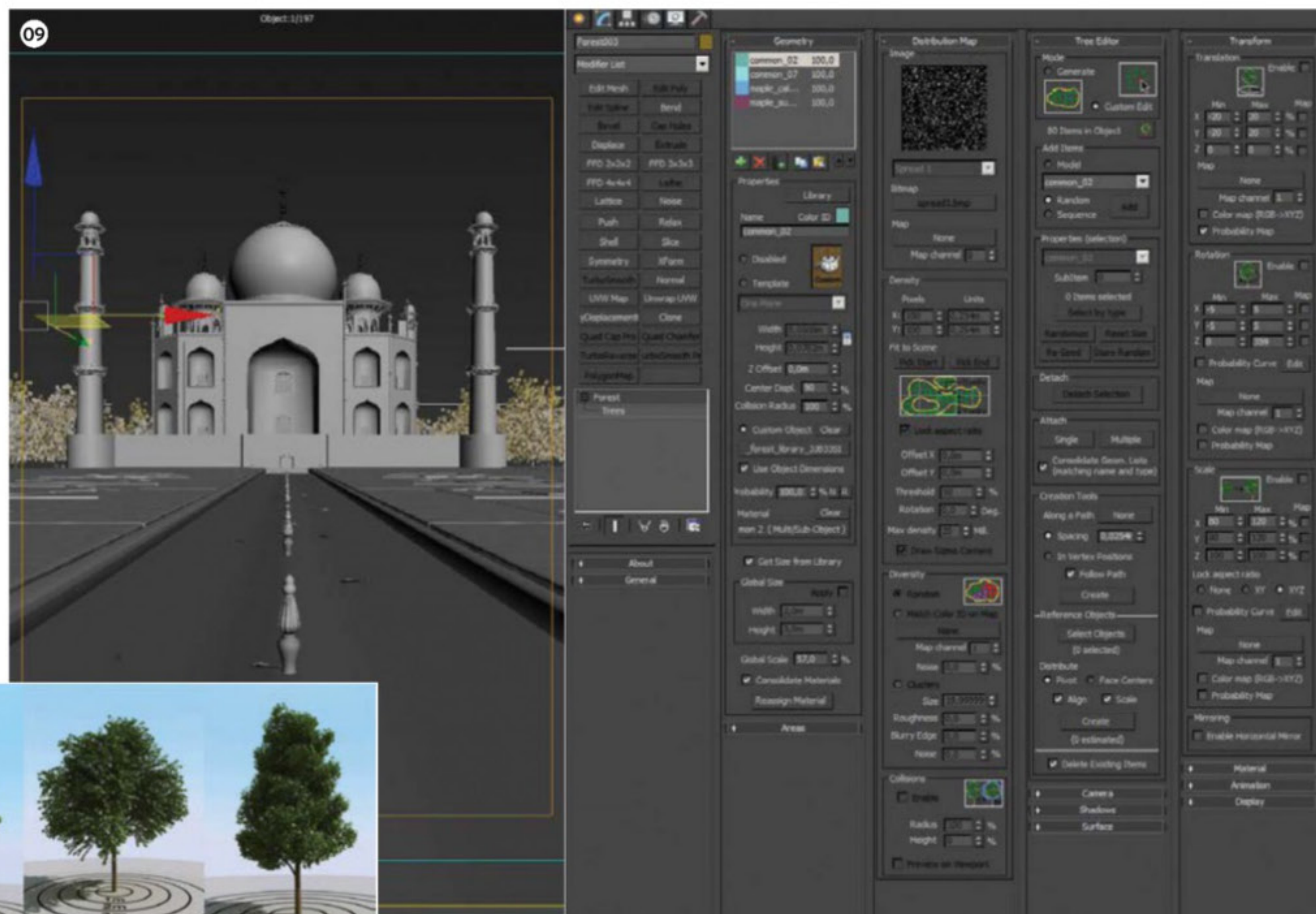
08 Include grass and bushes

For the grass lawn, use the Forest Pack models preset called Common Grass 01. When you're spreading the grass across the scene, check that there is some variation in both Scale and Rotation to create a random, realistic result. For the bushes, use two models from the Mentor Plants collection: the *Picea_nidiformis* for the small bushes and the *Thuja* for the central ones. Spread the bushes manually to place them where you want.



09 Add background trees

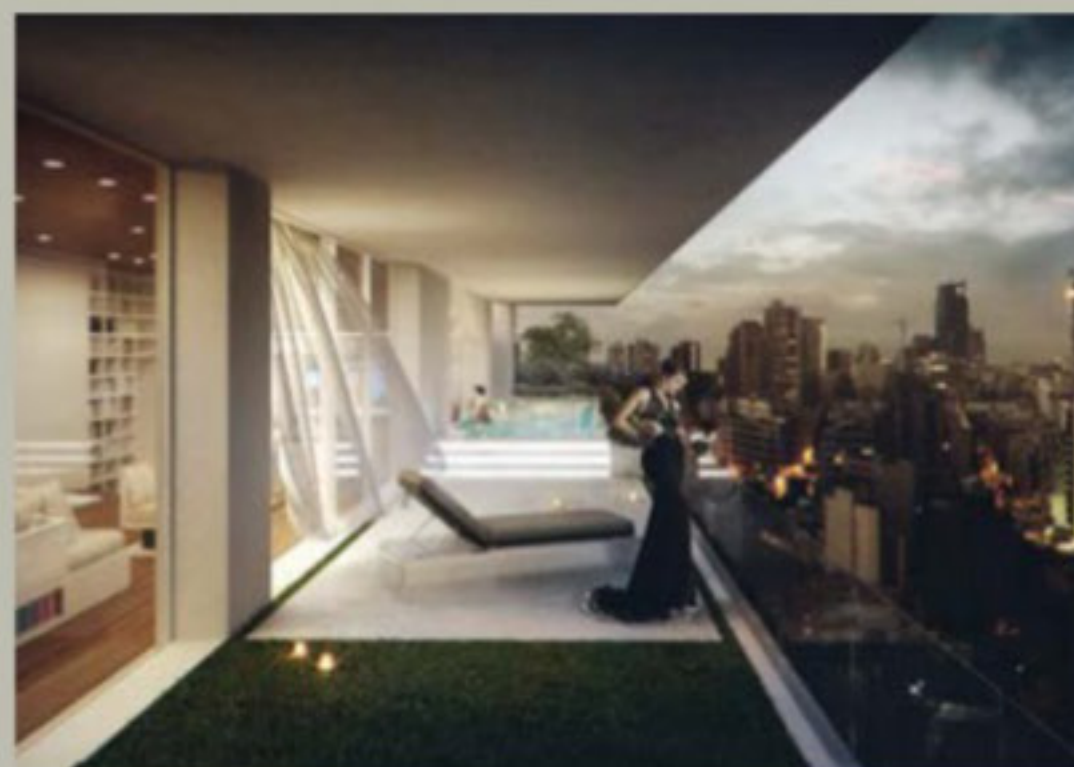
For the background trees, use four Mentor Tree models, from common_01, 02, 03 to 04. Like before, use the manual method to spread them out in the exact positions where you want them, setting both Scaling and Rotation to be Random. Always do this, as it will give you a much more natural look, and try to avoid repetition with the same models. Fill the background with trees next to the main section of the Taj Mahal to get a nice, even composition for the final image.



Artist Showcase

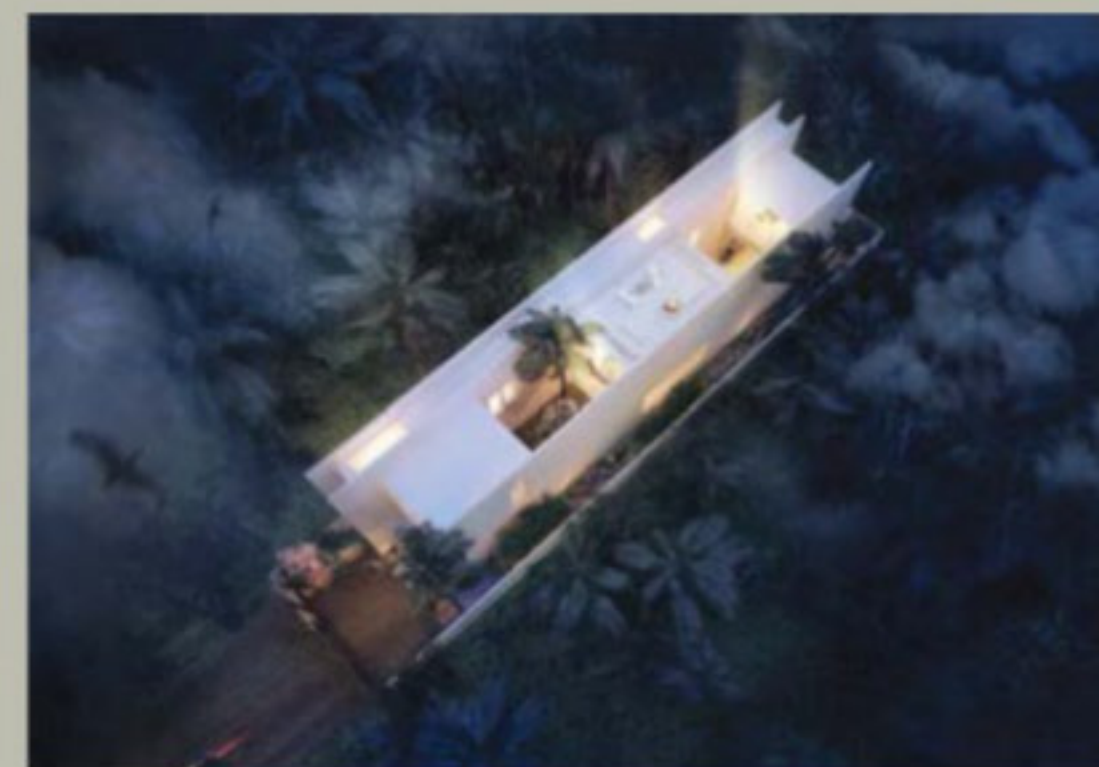
Sérgio Merêces

I'm from Portugal and I live in a beautiful city called Évora. I have been working in 3D visualisation for the past ten years, working on both national and international projects for both architectural and non-architectural purposes. I have focused my skills on the creation of beautiful and unique images for architecture.



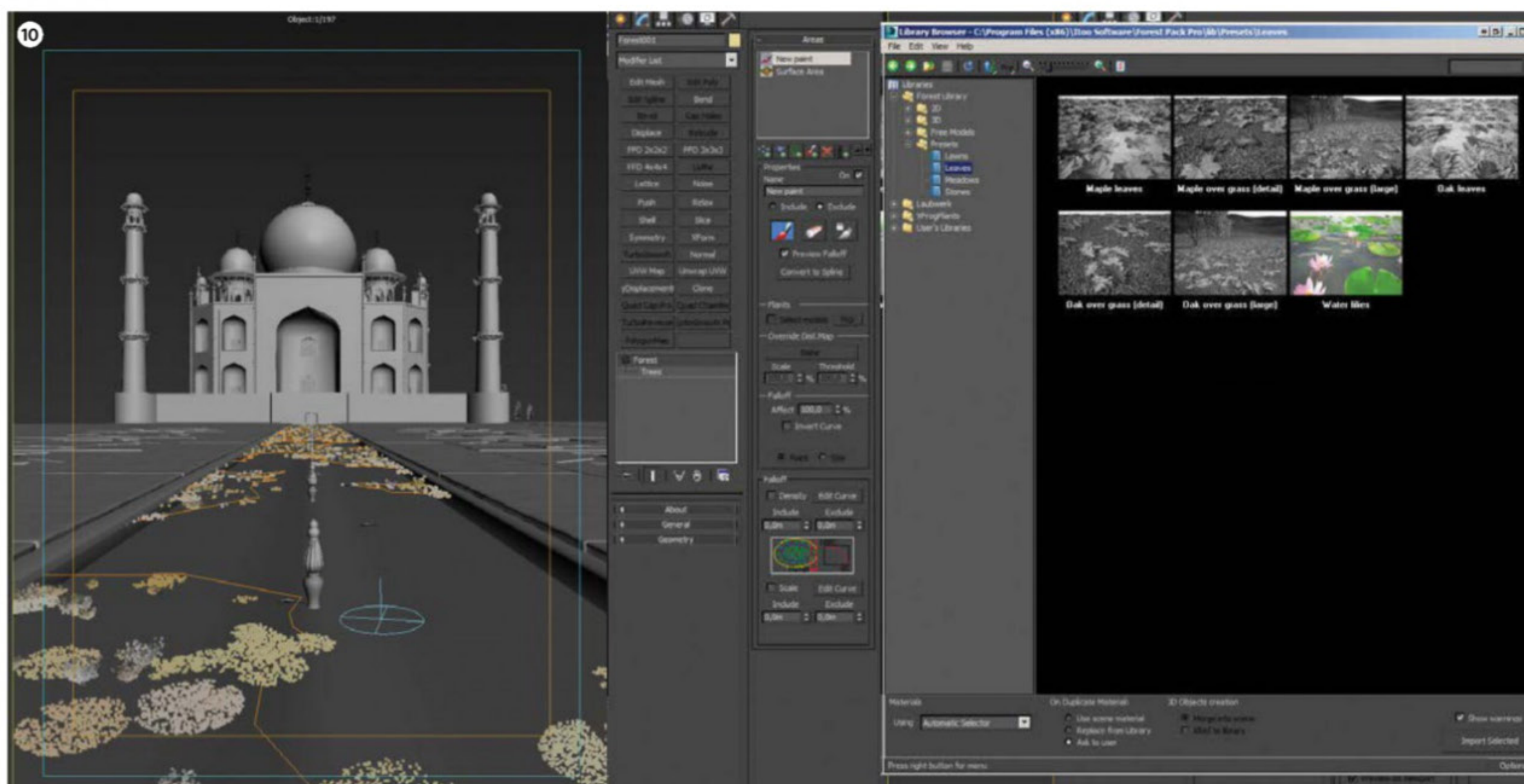
Penthouse Balcony 3ds Max, V-Ray, Photoshop (2014)

A project for the client Domaine Public Architects



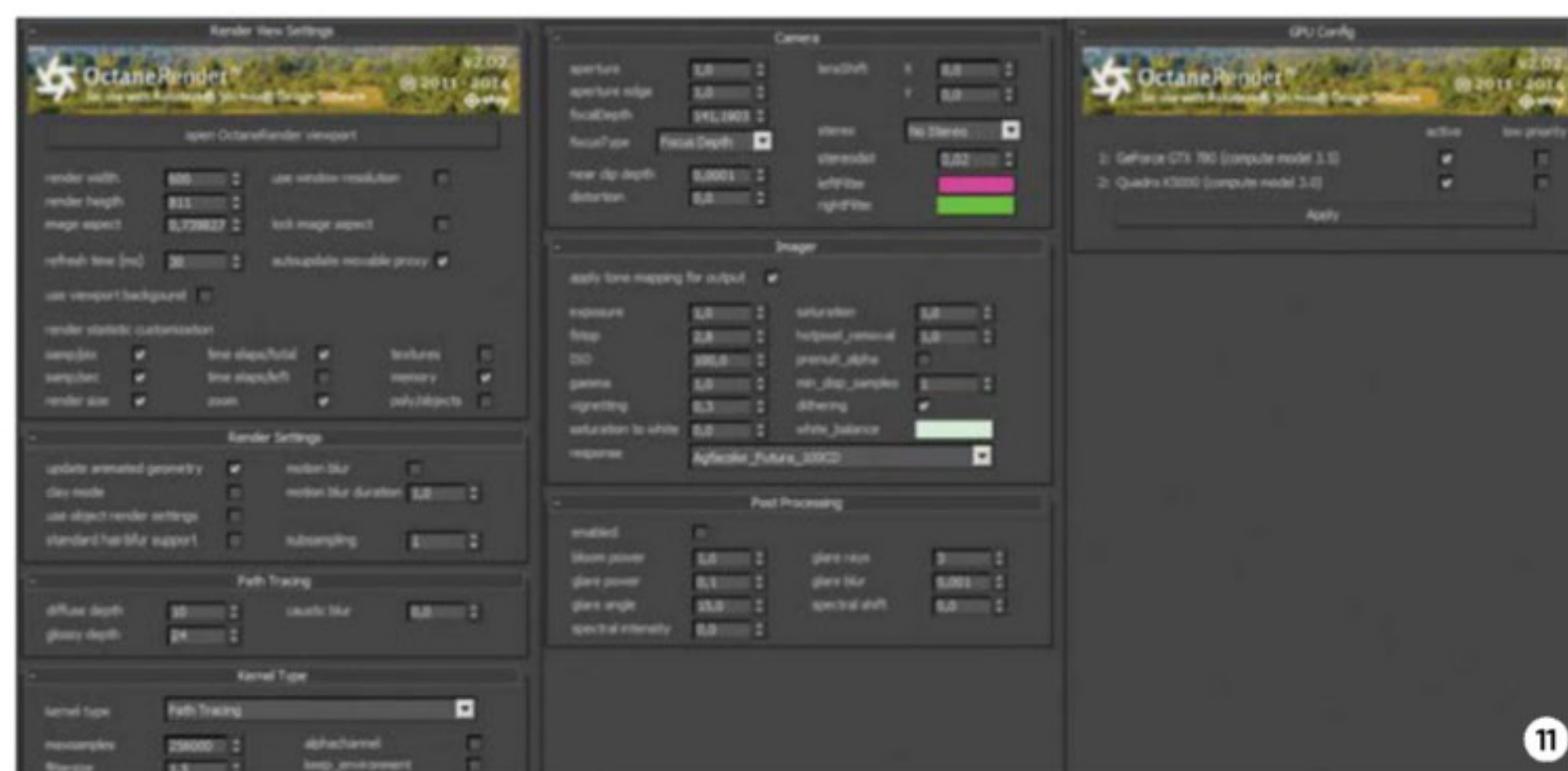
Tulum House 3ds Max, V-Ray, Photoshop (2014)

Another project that was created for the client Domaine Public Architects



10 Decorate the water To make the scene more realistic, add in water plants by choosing the Water Lilies preset that comes with the Forest Pack plug-in. Use the water plane model as the surface on which to spread the plants. Like before, use the Forest Pack Random Spreading option, then once they are spread out across the water use the Drawing tool to delete sections of the plants. To add even more realism to the water, have a go at adding ripples to the surface of the water to emphasise the realism of the scene.

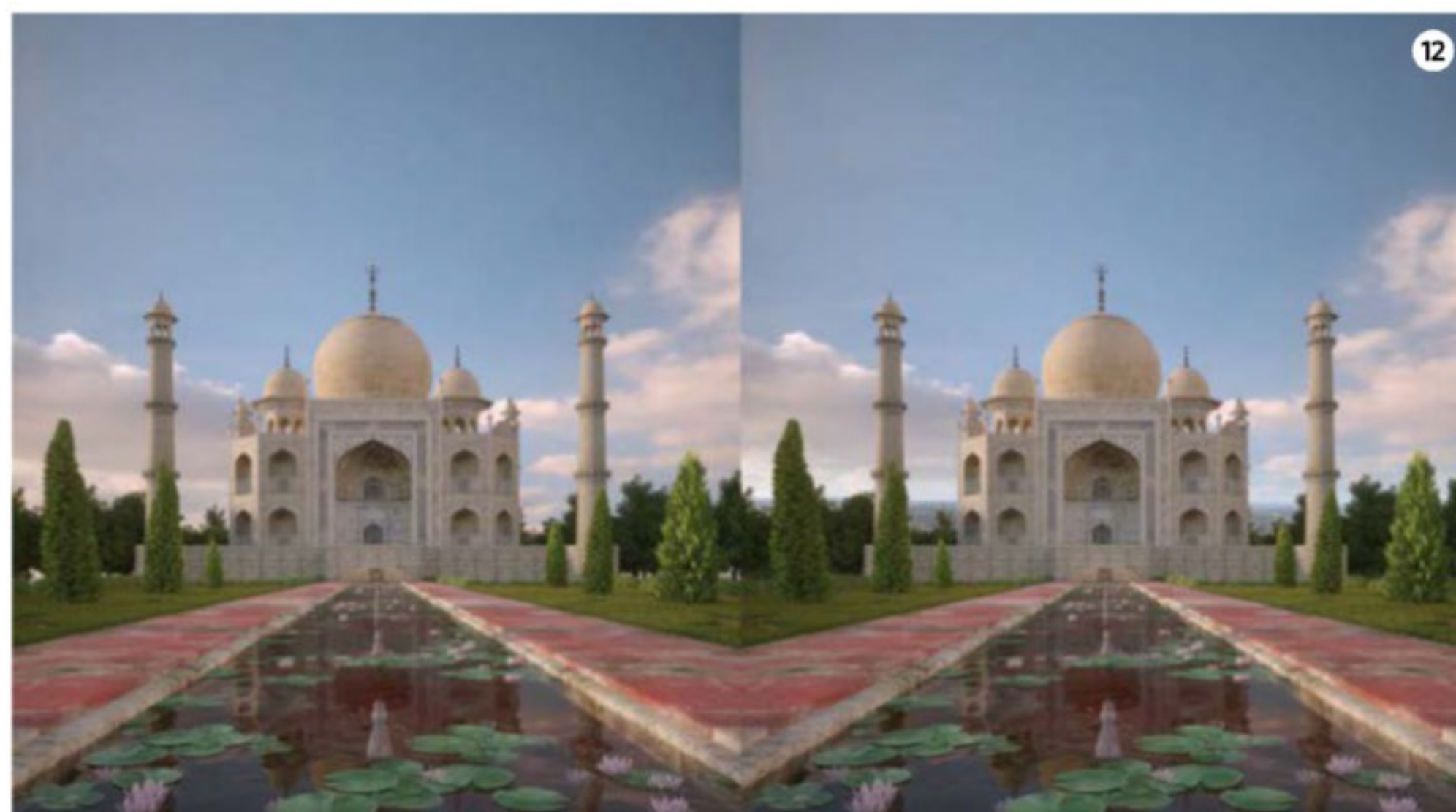
11 Render with Octane For this project I used Octane Render Engine because it's a powerful real-time renderer that is both fast and easy to work with. It has some limitations if we compare it with V-Ray, but Octane Render has some unique features that makes it a fairly serious renderer. It's also important to note that Octane Render is a GPU renderer, so the render speed will depend of your graphic cards. Once you feel that your scene is ready to be rendered, do a low-resolution test render to see how it looks. For my project, I set the final image resolution to 8,000px. Check out the accompanying screenshot to see what settings I used for my render.



12 Correct the raw render In this step we will correct some of the minor issues that come up in the raw render. In my project, I changed the background image and adjusted the sky and clouds. For any changes, always use the Render ID pass that enables you to create quick and precise masks. Once we've selected the background with the Render ID, we can separate the scene and sky. This means that we can now add another, more-suitable background underneath the object, tweaking the Gamma and Color Balance so it fits perfectly.



Reviera Abidjan 3ds Max, V-Ray, Photoshop (2014)
Another project that was created for the client Domaine Public Architects





13 Apply colour corrections After we've added our new background, do a few colour corrections in the image for the water vegetation, as they seem a bit plastic due to oversaturation. For this, use Photoshop's Selective Coloring function and choose the Greens. Adjust the settings so that it is less saturated and has a more yellow-coloured tone.

14 Add in 2D elements The initial idea I had for my project was to have a few fish in the water, so I did a search for free-usage images of swimming fish. Using Photoshop's Color Correction, Gamma and Brightness adjustment layers, we can match the fish in the image. Add more ripple effects to bring the water to life.

15 Finalise the scene The last step is to give a better colour grading to the image. For this, use the Magic Bullet PhotoLooks plug-in from Red Giant. This is a great plug-in that enables us to do quick and powerful colour corrections. Use the Crush tool to edit colour-tone curves, which will adjust the overall white and dark areas. Add a Vignette and Diffusion to get a more-atmospheric vibe, then apply these modifications. Once the effects have been added, sharpen the overall image.

Atmospheric effects

Atmospheric effects are really important to emphasise the sense of distance in an arch-vis scene. For this, use the Z-Depth render pass for the haze effects. Using a mask on the Z-Depth layer, paint light rays and some haze – not too much, however, as we don't want to create a morning fog, but just to give a sense of distance to the image. For the Sun effect, use the Red Giant's Knoll Light Factory, which will give a really nice, realistic look to the image.



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Country France

Software used Sculpttris, 3ds Max,
Mudbox, V-Ray, Photoshop



Technique focus

Incredible 3D artists take us behind their artwork

SCULPTING I started by creating the head in Sculpttris. It didn't have a great topology for sculpting, but it didn't matter as I intended to retopologise it with 3ds Max. Next, the bulk of the sculpting was done in Mudbox. Creating multiple layers while working makes for easier corrections. On this new mesh I started refining and sculpting details. **Southern Ground Hornbill**, 2013



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Lorenzo Zitta

Personal portfolio site
www.zittart.com

Location Spain

Software used LightWave, ZBrush, Photoshop

Expertise Lorenzo specialises in creating images for the publicity industry

Merge 3D with photography

Octopus in the freezer 2014

“Integrate a 3D character into a photographed background for a humorous twist”

Lorenzo Zitta is an Italian freelance digital artist in CGI and retouching. He has also won several international photography awards



When creating digital art, the aim is usually to show the process of modelling, sculpting, painting, mapping, lighting and rendering with different tools to achieve a high level of detail, and this goes for our tutorial as well.

To begin with, we'll develop the mesh that will form the base of our octopus model. From this point, we'll start to work on details that will add to the realism of our character.

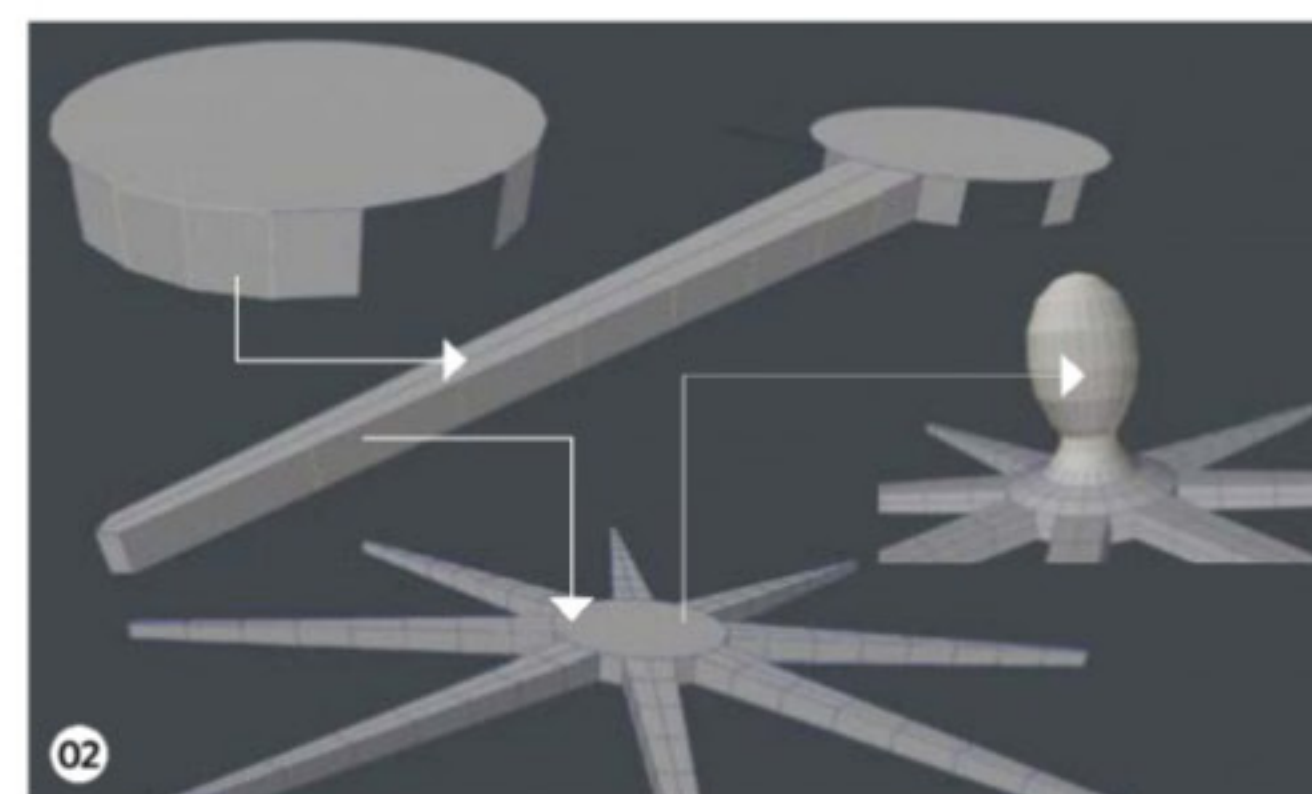
This may mean splitting the model into sections, which can then be worked on separately. We'll also take a look at using UV, Normal and Displacement maps to emphasise the effect of our character. Last of all, we'll have a go at setting the scene and rendering it.

Concept

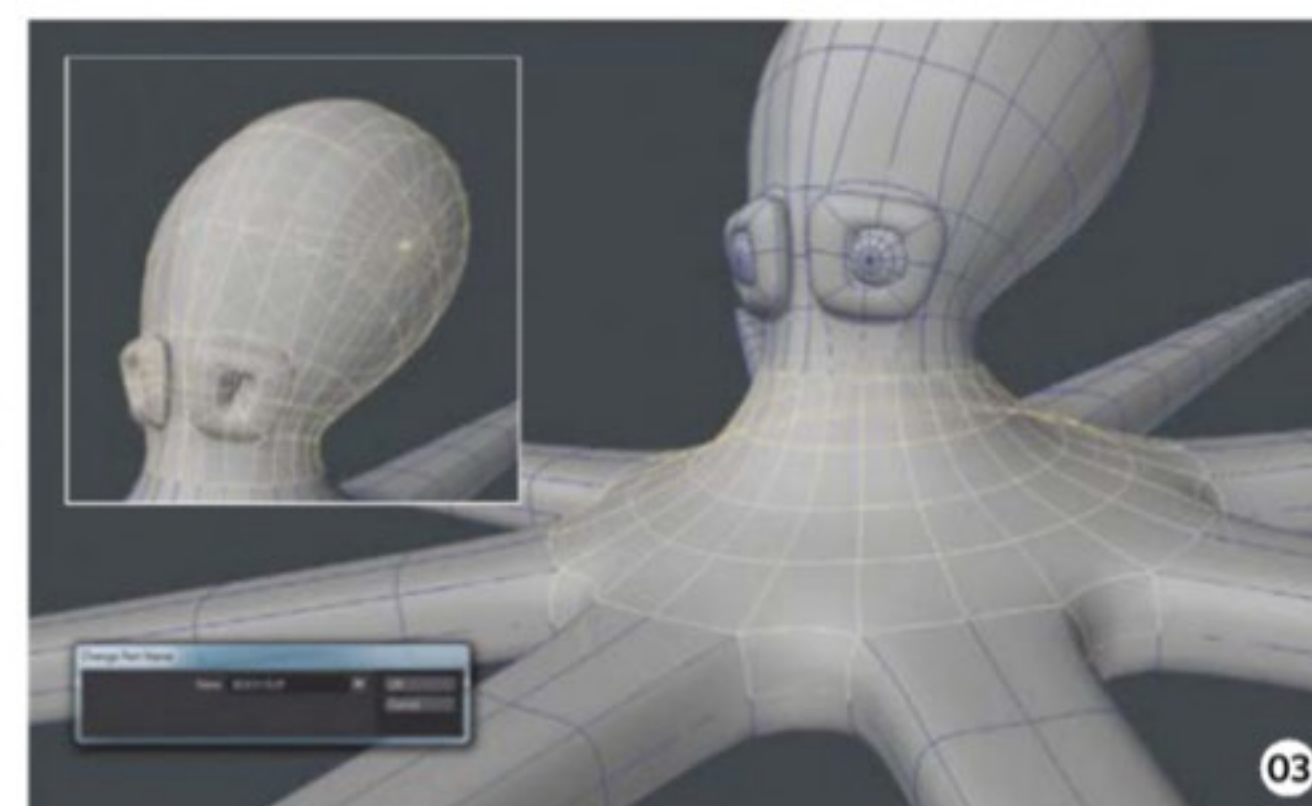
The aim of this tutorial is to create a comical 3D character set in a real-life, photographed, unique environment.



01 Do your homework As with any project, finding reliable reference images is absolutely vital to create a realistic character. Use the internet to help you find decent reference images. The choice of photographs that you use will be key in achieving a realistic appearance.



02 Born from a cylinder Our octopus originates from a cylinder, which is the basic object that enables us to rapidly form the body and tentacles. Manipulate this cylinder using the Extrude, Extender, Bevel and Array tools. Don't worry too much about the exact dimensions of the object, just aim for a more-or-less actual size before sending it to Layout.



03 Prepare to export to ZBrush To manage the UVs in ZBrush, we have to prepare the model for export. We need to subdivide the model parts, including the tentacles, body and head. Select all the tentacles and in the Detail tab in the Parts section, click on Create Part and rename it Tentacles. Do the same for the body and head. At this point, leave the entire object in one layer, save it and export it as an OBJ.

Optimise your project

To save time, the suction cups underneath the octopus haven't been modelled, as they are hidden under itself. In a majority of projects – especially for my own – the attention should be on the foreground, as this area is much more important. Any object that detracts from the focal point is simply unnecessary!

Download

Tutorial files:

- Tutorial screenshots
- Texture images

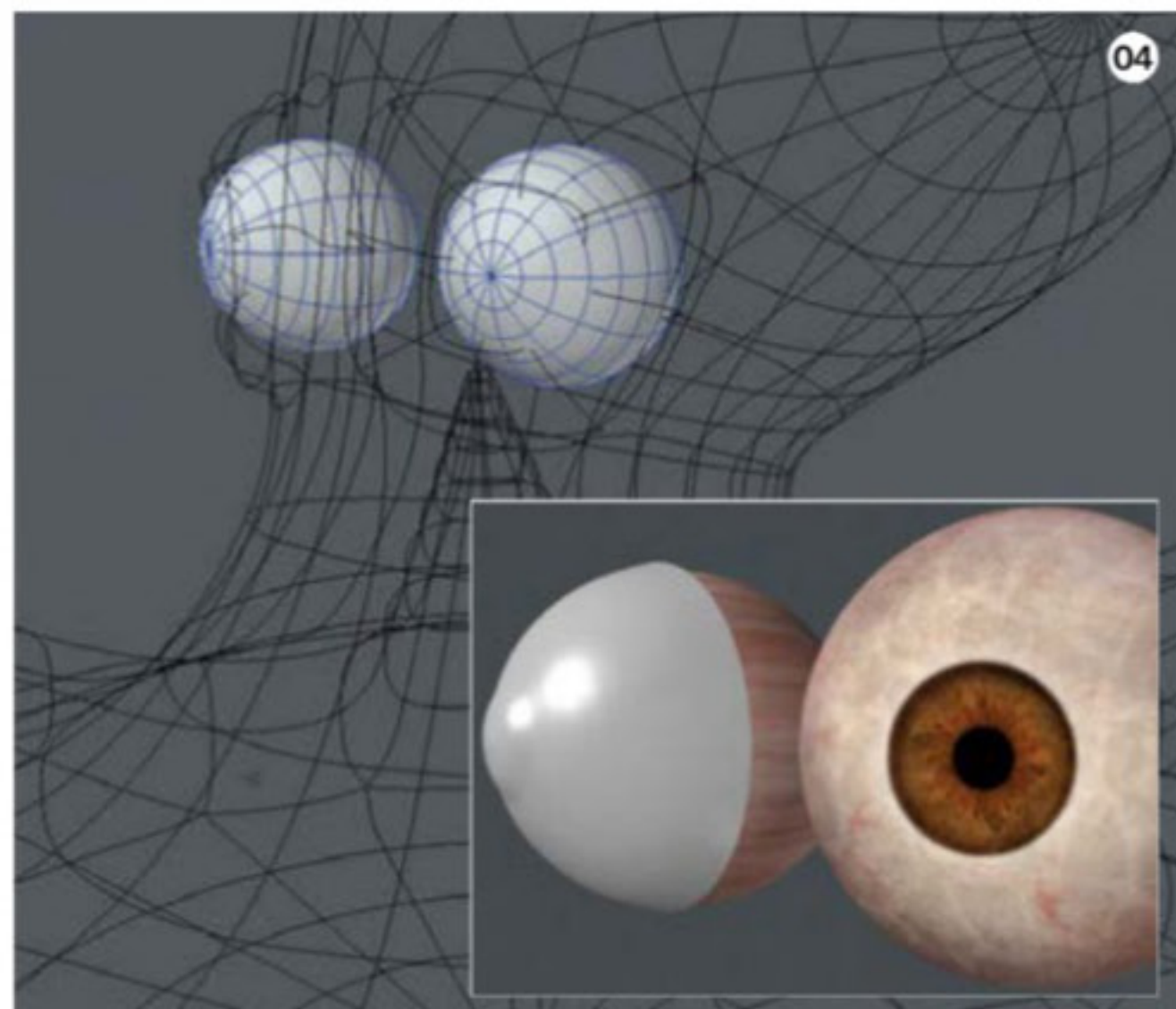
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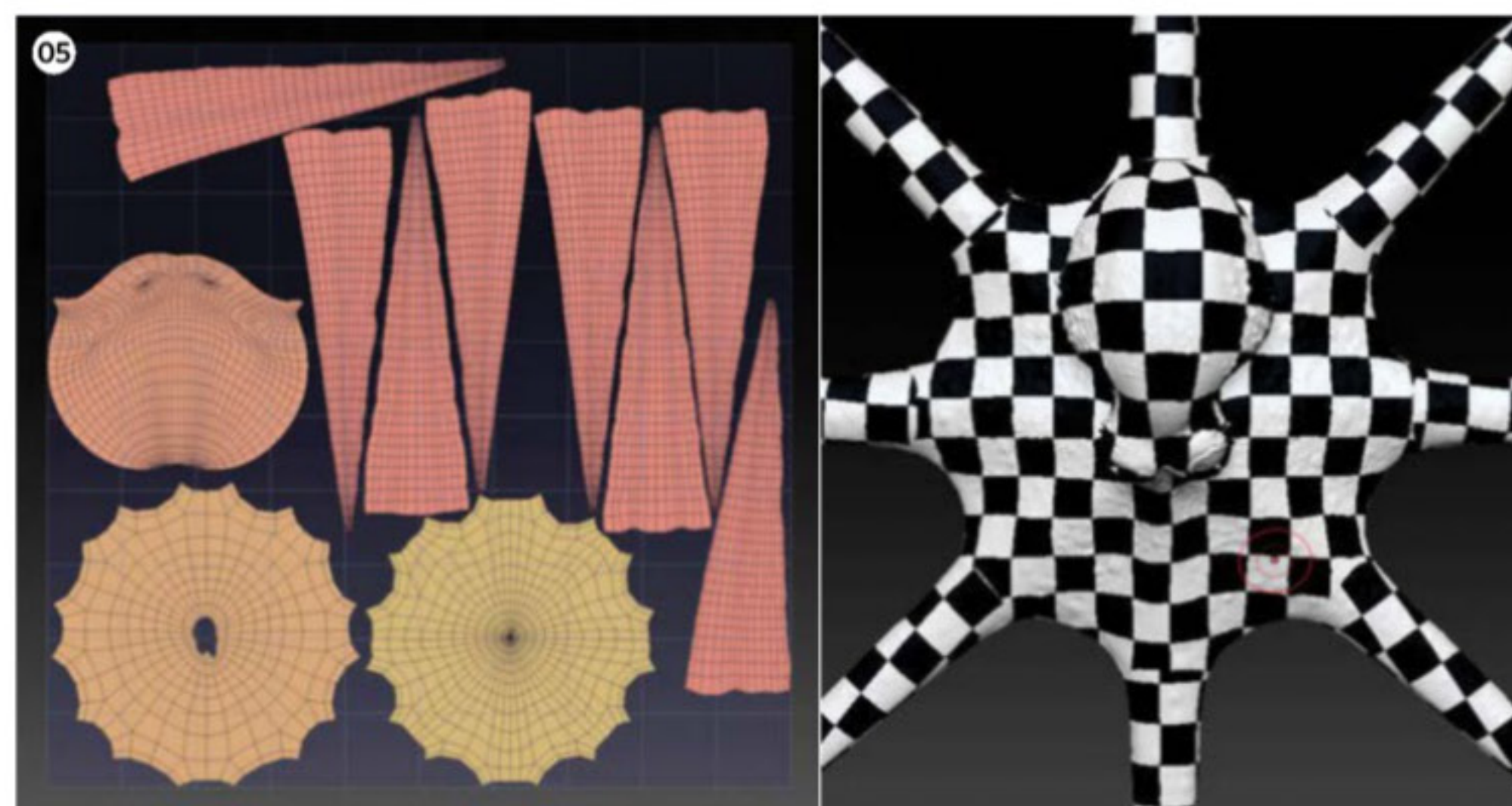
Learn how to

- ✓ Block out the base mesh for the model
- ✓ Create organic stencils for digital sculpting
- ✓ Refine and pose the model
- ✓ Set up a scene and configure lighting

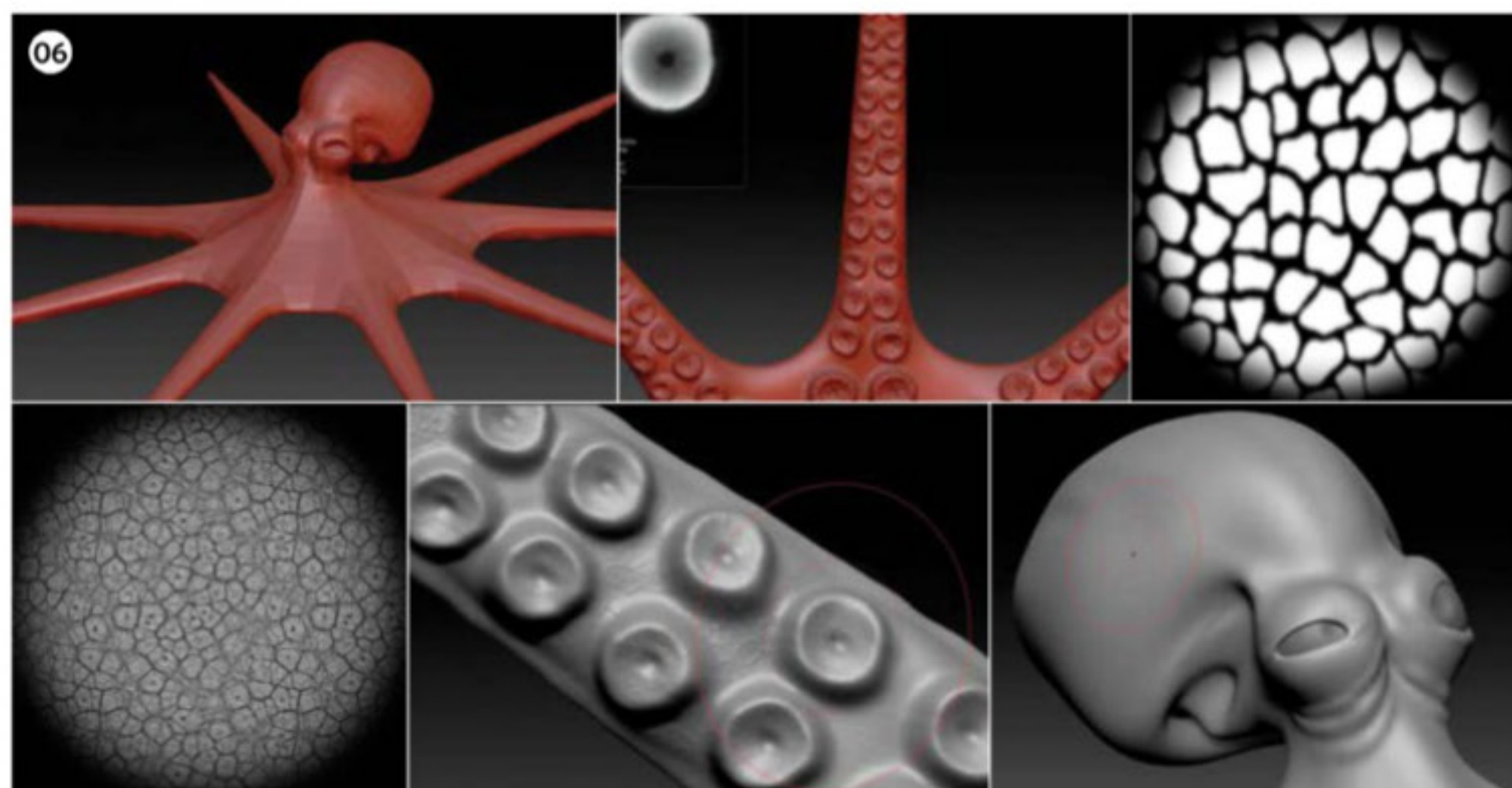
04 Create the eyes For the eyes, don't overcomplicate things for yourself. When dealing with a character with comic elements, I only model a sphere and a semi-sphere. The latter tends to be larger in diameter, with a reflective and transparent material applied to bring the eyes to life.



05 Create the UVs Using UVMaster in ZBrush, we will choose the Work On Clone option for our model. Before clicking the Unwrap button, tick the option for PolyGroups so we can disperse the UVs over the sections that we created in LightWave. Before we start painting, we must try to spread our UVs as evenly as possible. To do this, temporarily apply a checkerboard pattern to the model to look for texture stretching. As we're working on a clone, we now need to copy the UV and paste it onto the main object. We are now ready to paint.



06 Sculpt in ZBrush Once we have our base mesh, export it to ZBrush to start to sculpt and refine the details. There are three tools in ZBrush that we should use, including the Standard, Move and Inflate brushes. We'll also use four Alphas – one for extruding the suckers of the tentacles, with others for the relief of the skin, wrinkles and bumps. Use custom brushes and the default Alpha to add details to the model. It's very important that the details are sculpted with a high resolution in order to have greater control and to improve the outcome of the Alpha layers. This task is very similar to what happens with layers in Photoshop.



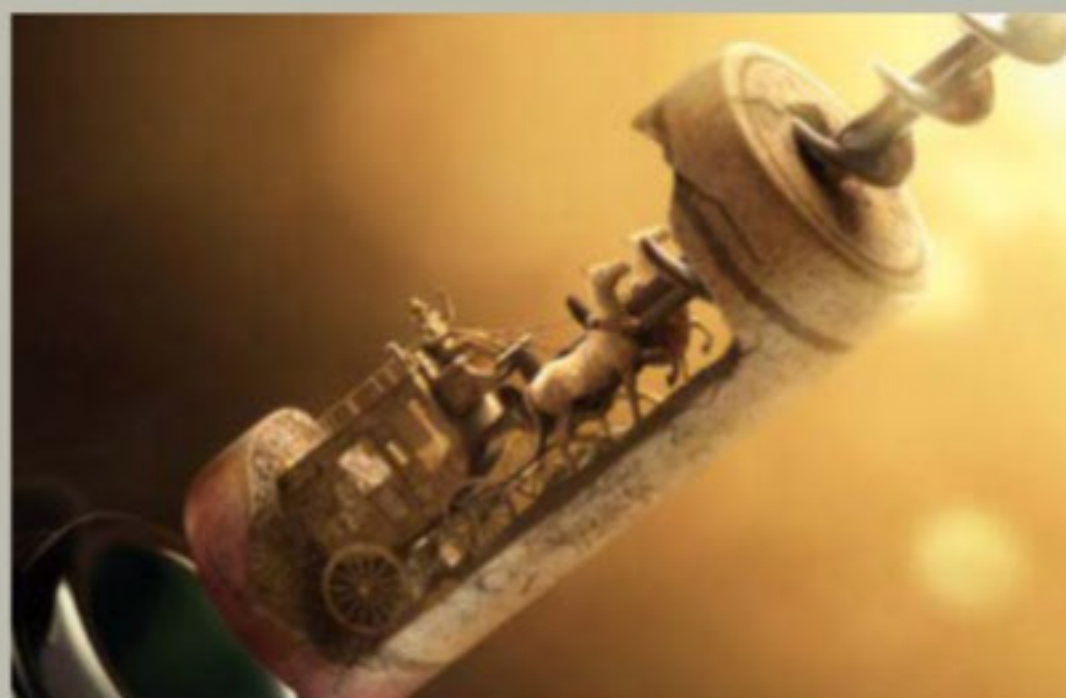
07 Begin painting When it comes to painting the model, we will use similar techniques to sculpting. This means that we'll use a separate layer for each type of texture, so there'll be one for spots, one for veins, one for wrinkles and another for colour variations. The Standard brush set to Color Spray enables the layers to blend nicely with one another.



Artist Showcase

Lorenzo Zitta

Since my childhood, I've always been very creative. Throughout my teenage years, I always drew and sculpted, constantly trying to improve on myself. Around ten years ago, I got into photography and photomanipulation, which led me to realise that this was my future. Two years ago, I started working in 3D and now I work as a freelancer in the graphics industry.



Old-wine LightWave, Photoshop (2013)

I created this image for a famous brand of Spanish wine. For these kinds of macro images, it's very important to use highly detailed textures for a realistic result.



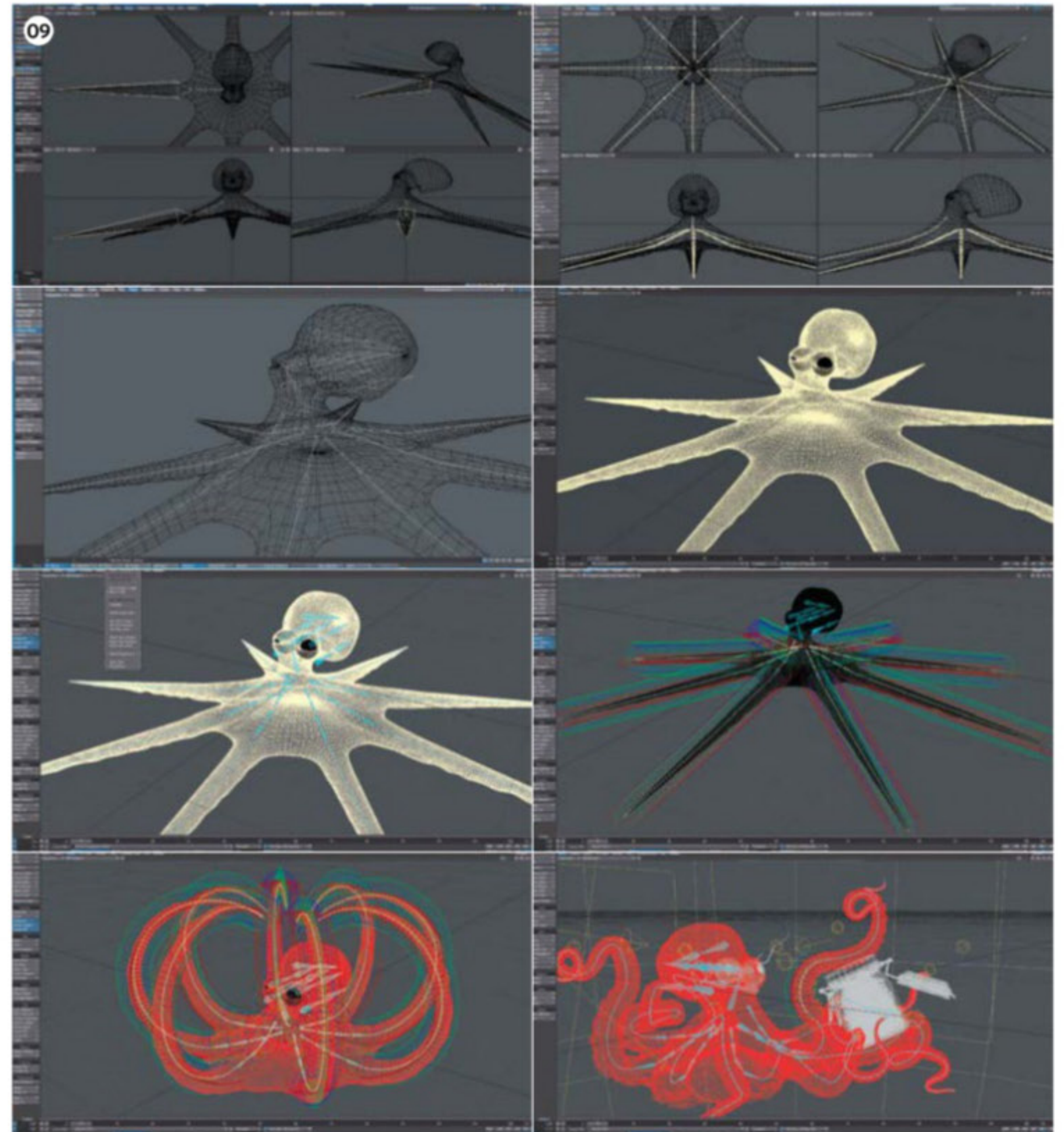
CUBISM ZBrush, LightWave, Photoshop (2014)

I created this image for a famous Italian brand of jarred chopped tomatoes. To create the image, I used the Spotlight tool in ZBrush to paint the texture.

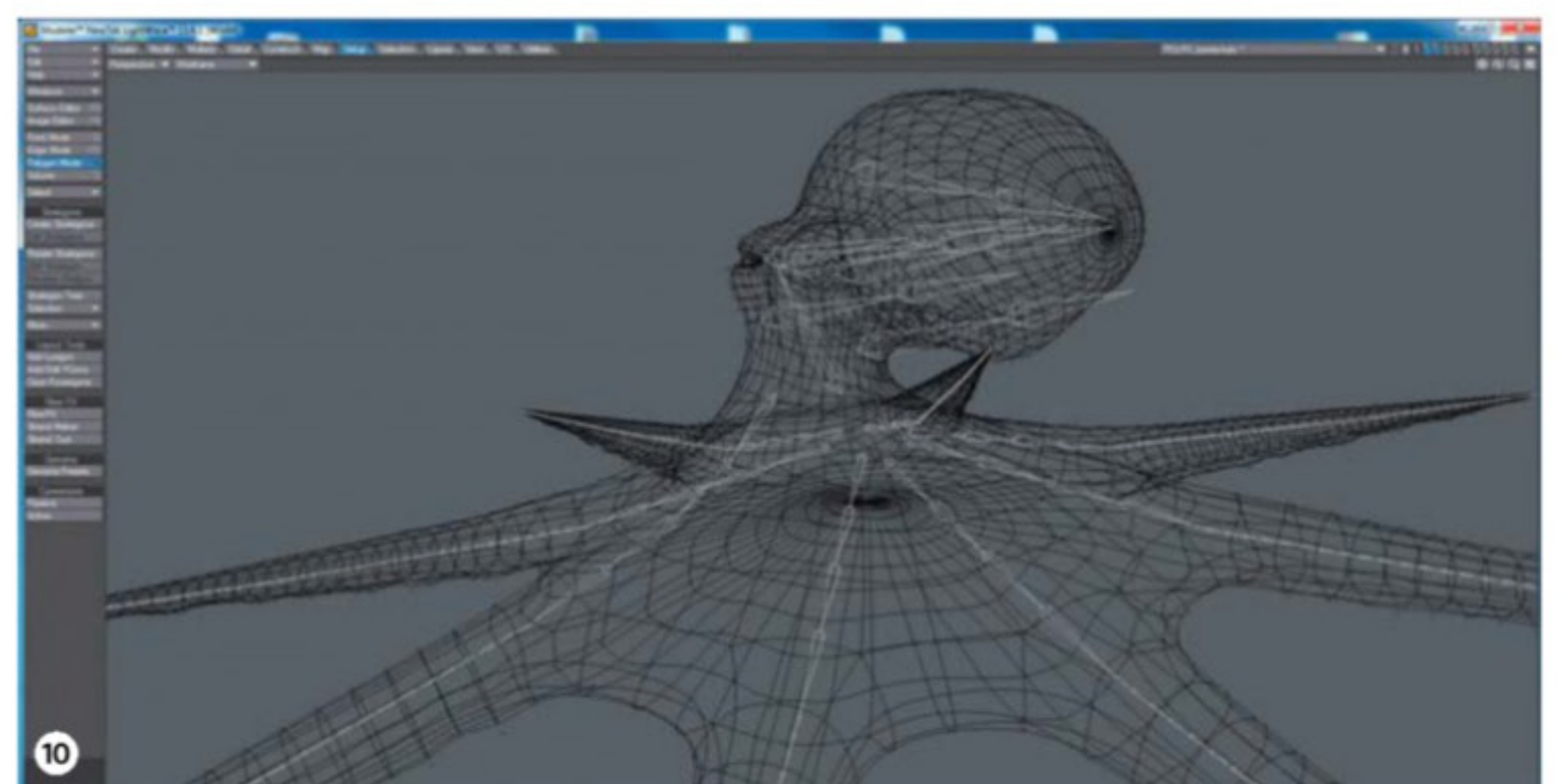
08 Export to LightWave We now need to export the Color, Normal and Displacement maps at as high a resolution as possible. Next, use GoZ to export the model to LightWave. Once sent into LightWave Modeler, the octopus will be in its basic state without much detail, but with an improved structure from what we originally exported. The results will become visible once we start working in Layout.



09 Create Skelegons In Modeler we'll add the Skelegons that will become the bones for posing the model. In the Setup tab in Skelegons, go to Create Skelegons. Here we will make a single bone that will go from the base of the octopus to the end of the tentacle. Next, select it and split it several times using Split Skelegons. Split it enough times to give it the density we need for a natural organic deformation. Take advantage of the symmetry of our model to copy the Skelegon of one tentacle to the rest of them by making a Radial Array like the one we did to create the tentacles. Add extra bones for the head to avoid unwanted deformations.



10 Send into Layout with the Skelegons Before sending it to Layout, make sure that the Skelegons and the model are in the same layer. Check that the model is clean of any one- or two-vertex polygons, overlapping polygons or unconnected points. These things can cause problems when converting Skelegons to bones.



Gta-monopolycity LightWave, Photoshop (2014)

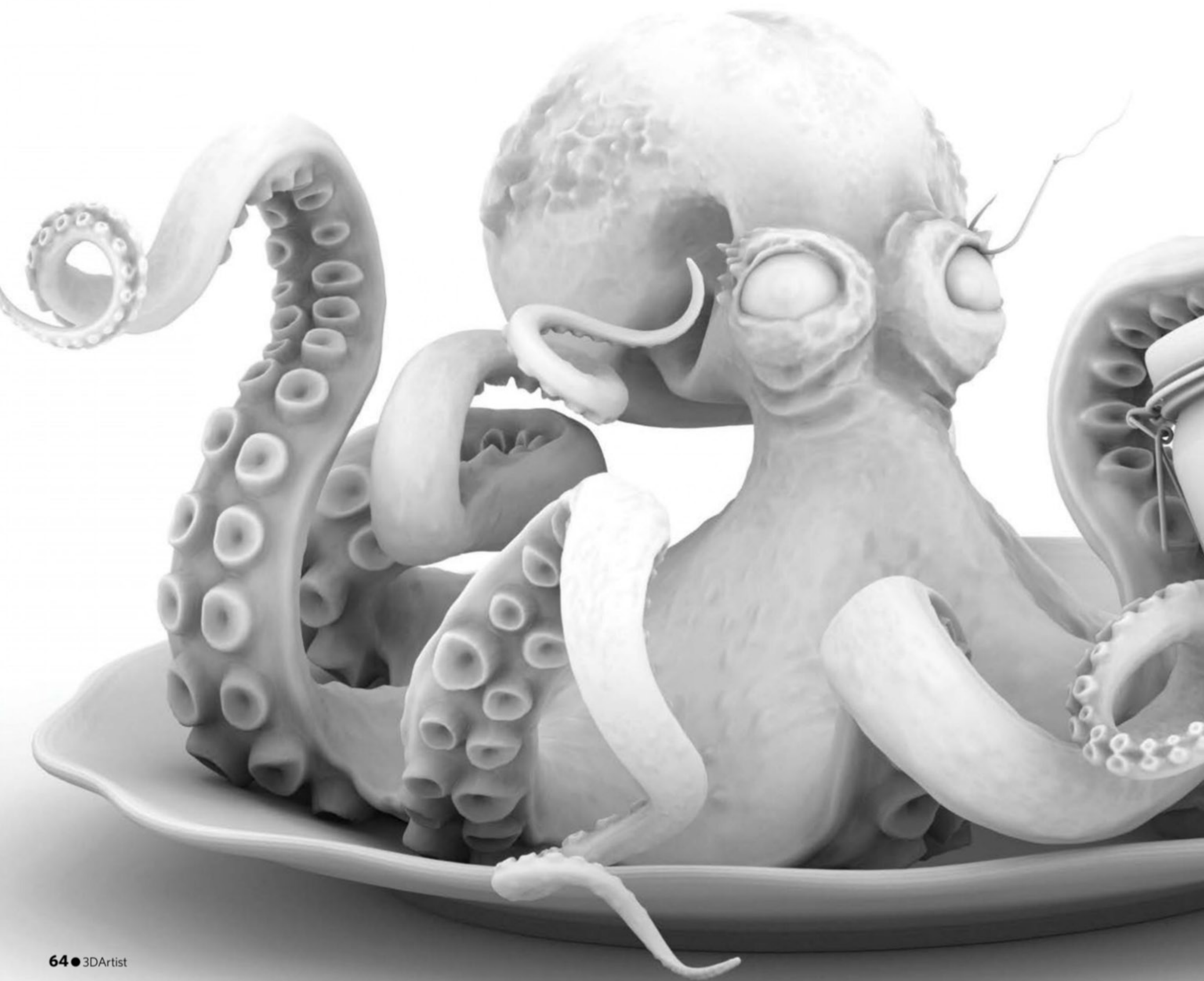
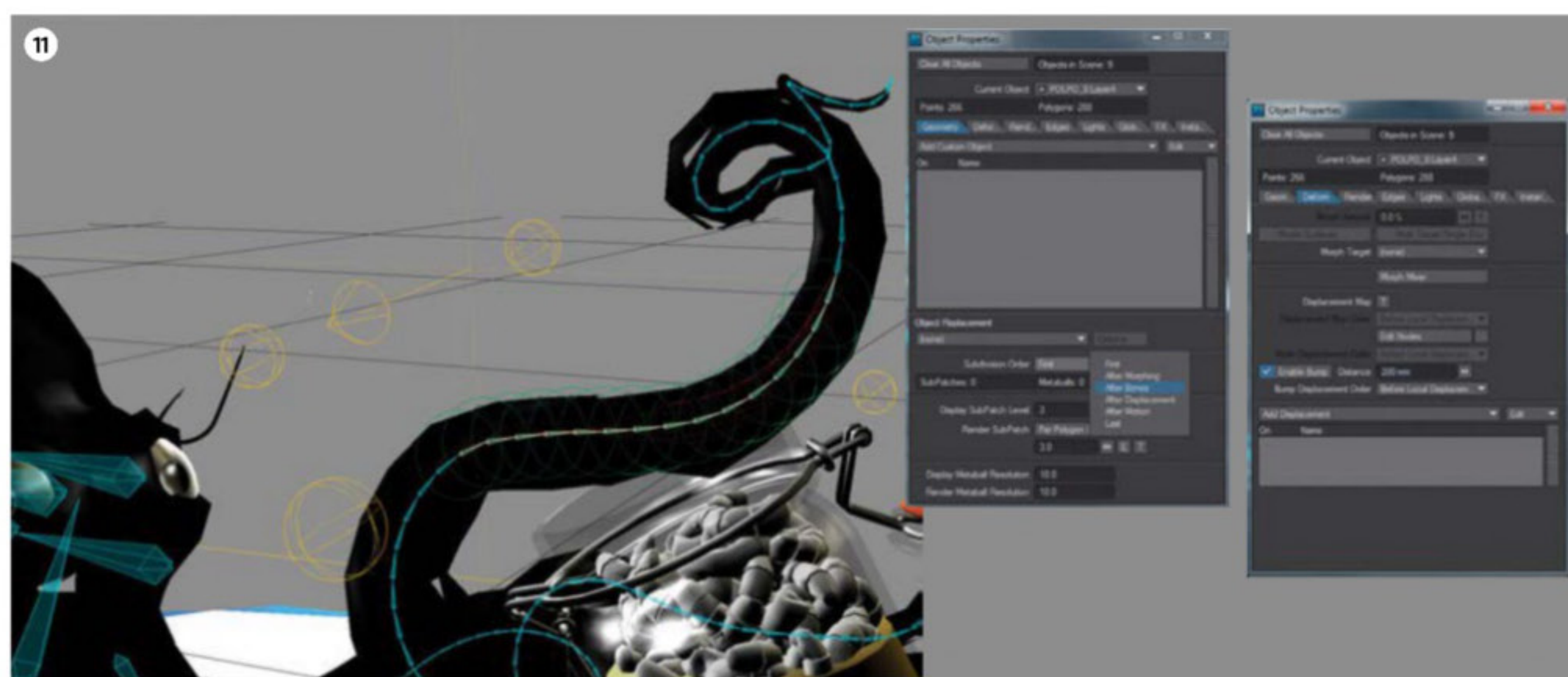
This was a personal project. It was fun to imagine what would happen if Tommy Vercetti from GTA happened to appear in the middle of a game of Monopoly.

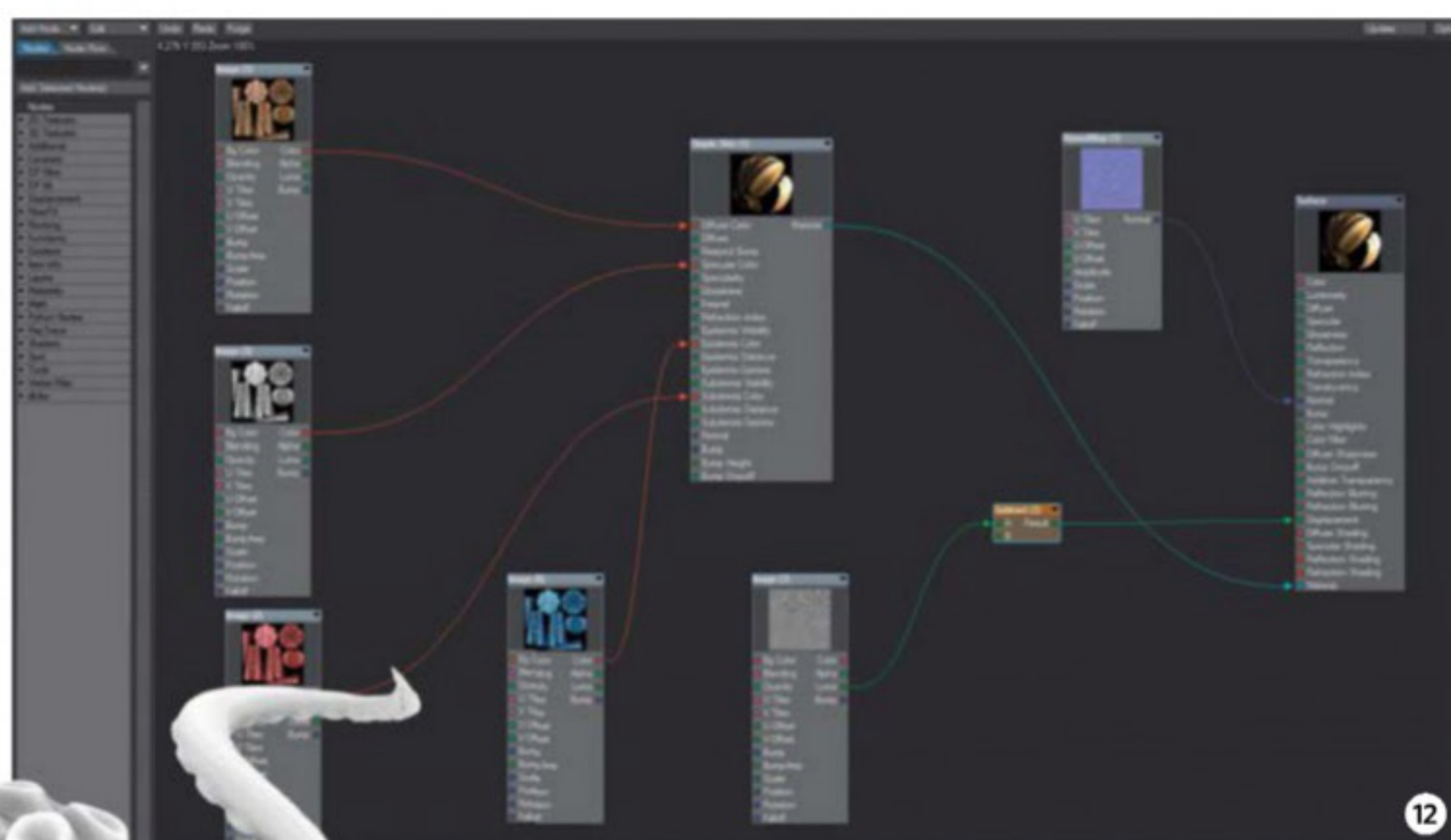
Work in sections

It's worth making the most of your model when it's separated into PolyGroups. This means that you can work on sections of details, such as the tentacles or eyes, in isolation to get a better idea of how the area will look when the model is complete. As previously mentioned, the eyes were created with two spheres and a surface layer with shine and reflection added. Once this has been brought into Layout, we can apply pre-painted maps from Photoshop. To find plug-ins to use with LightWave, visit www.mikegreen.name/Lscripts.html.

11 Convert Skelegons into bones

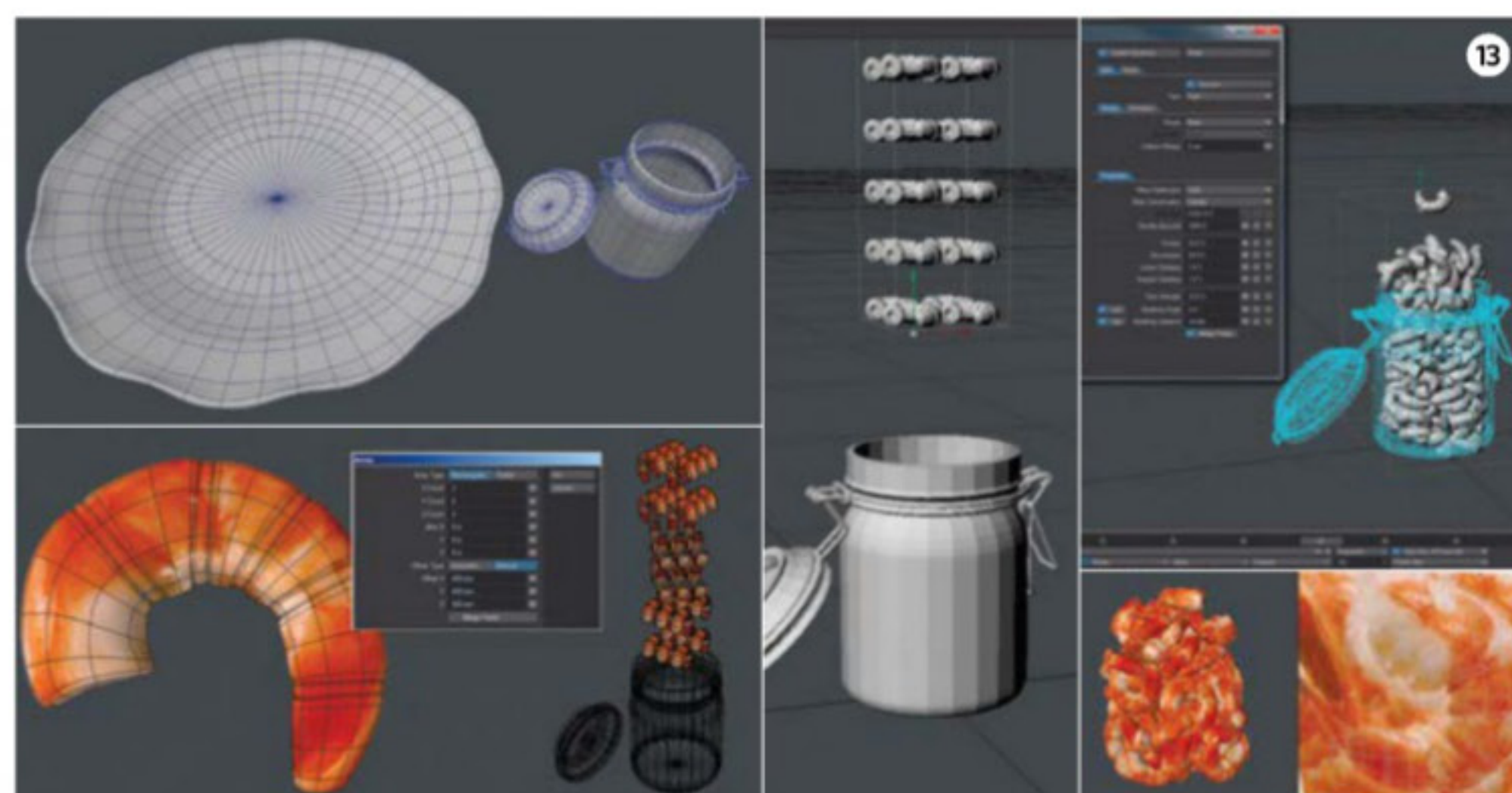
Once we have sent the model to Layout, none of the bones should be visible, so we have to convert the Skelegons to bones. Select the octopus model, go to the Setup tab and in the Add section you'll find Cvt Skelegons, which will convert the Skelegons. Before we start moving bones and posing the octopus, it's important to go to the Properties menu of the octopus and set Subdivision Order to After Bones.





12 Shade the octopus For shading our model, use a node-based technique, with Simple Skin as the base shader. This will enable us to get a fast and intuitive subsurface scattering effect. Several images were used, including Diffuse for the base, Epidermis Color for the next layer, Subdermis Color for the lower layer – which was given some colour variation – and a Specular map to define where it will be shiny.

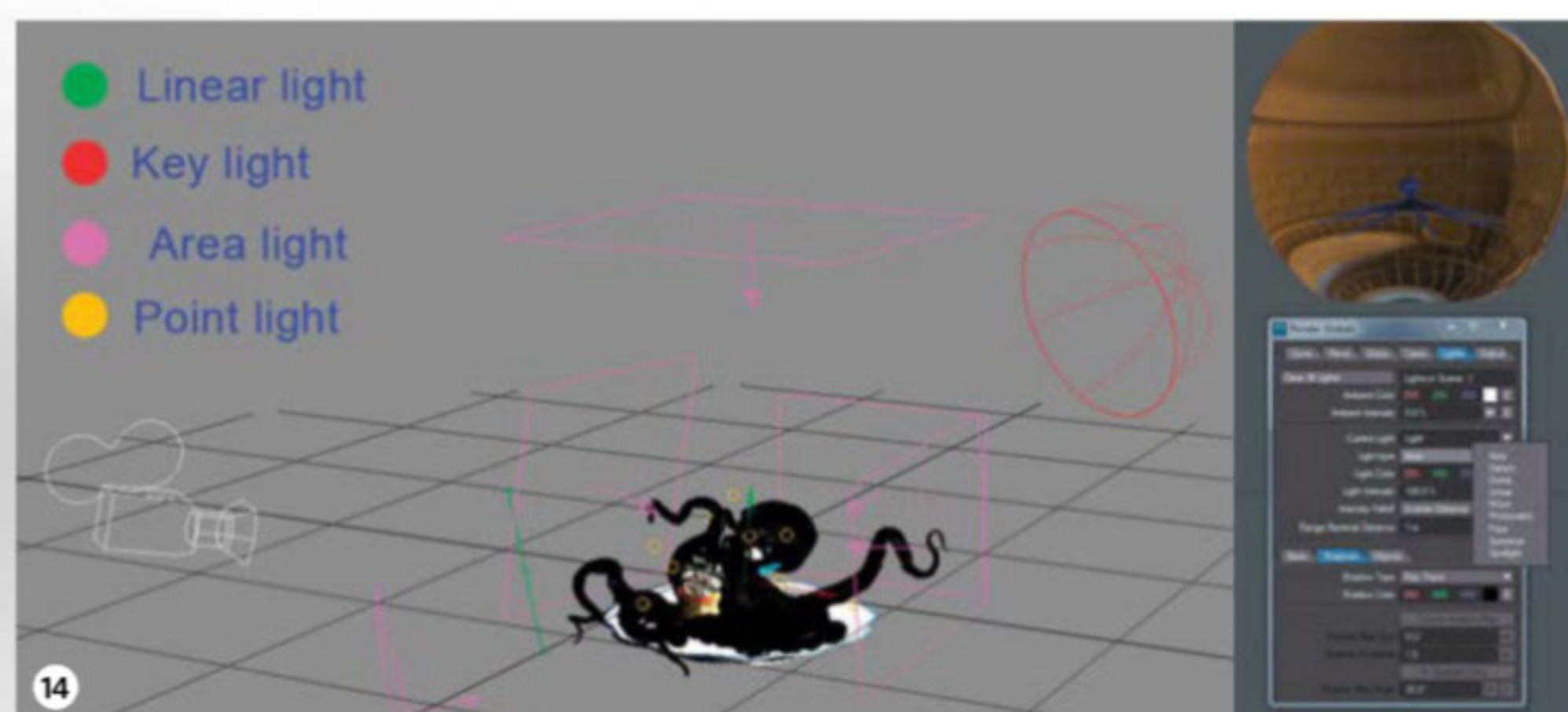
13 Fill the jar with shrimp We now need to build a plate and a jar from Primitive Solids that will be the base that our octopus rests on. In Modeler, assign the jar model to a background layer and make a rectangular Array with the previously modelled and textured shrimp. Ensure that this forms a column that is not wider than the diameter of the jar. Take these two layers into Layout and apply LightWave's Bullet Dynamics to create a physically realistic drop of the shrimp into the jar to achieve a convincing look.



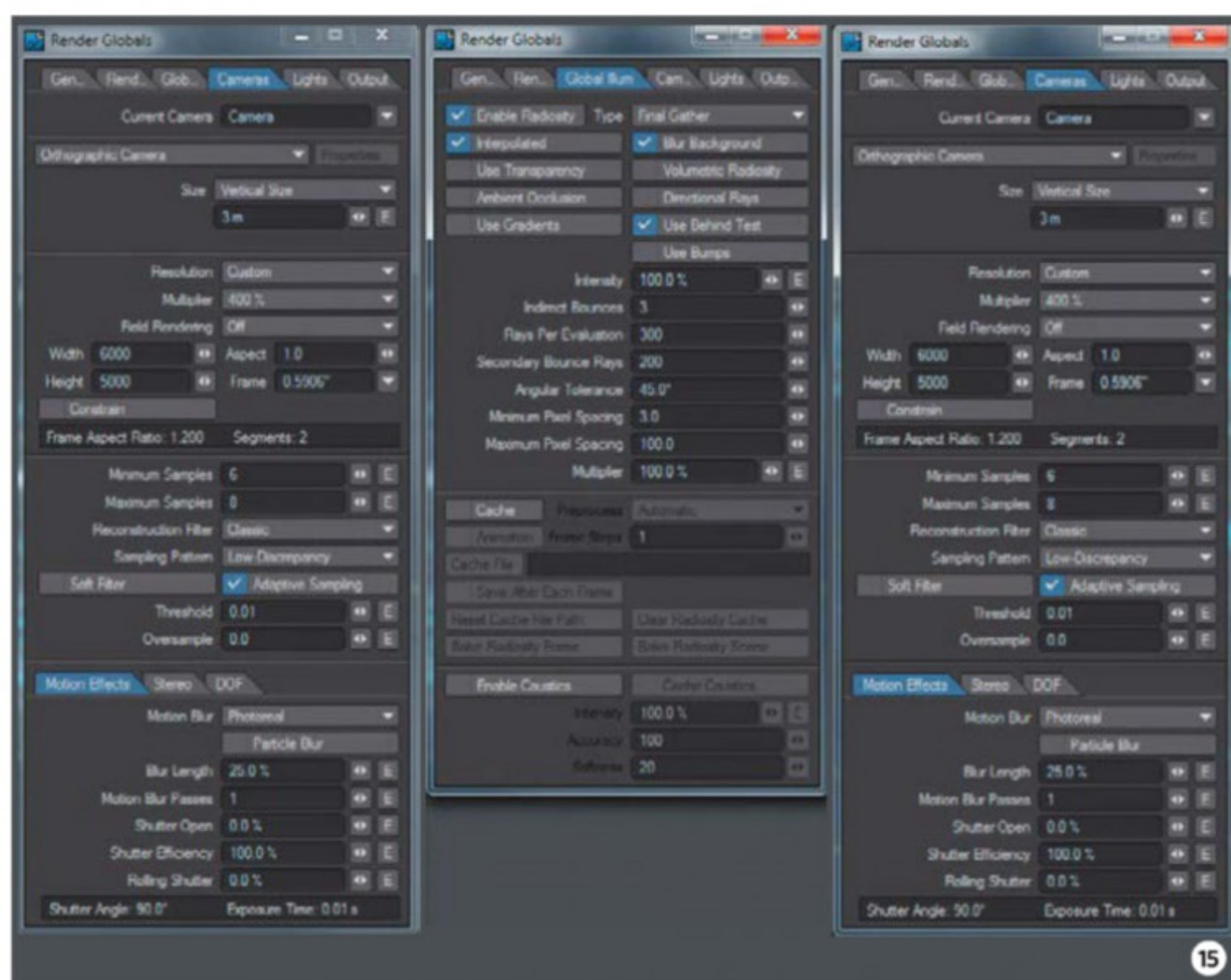
Make the most of maps

If you're not getting the expected result from your Displacement map, this may be because the model is not subdivided enough yet. To fix this, select the octopus, and in the object's Properties menu (press P), pick the Geometry tab and find the Render and Display Subpatch Levels. We should focus on increasing the Render Subpatch Level. Be aware that increasing the Display Level too much could make your system completely unresponsive. Keep in mind that VPR works with the Display Subpatch Level, not the Render Subpatch Level, so this won't give you a correct representation of your Displacement map.

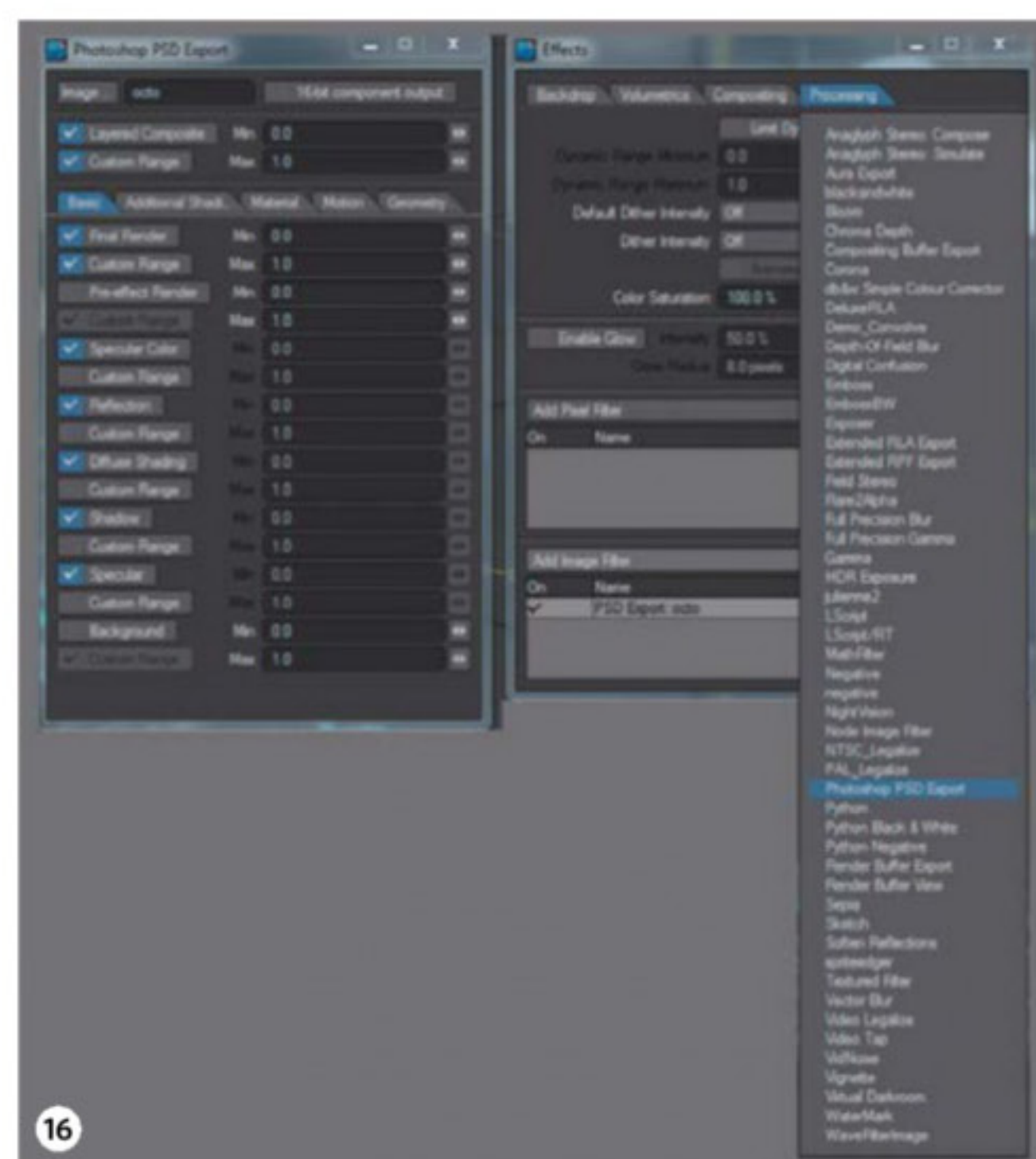
14 Add lights Begin by using a sphere with the backdrop image mapped onto it. Lighting this sphere with global illumination will let it bathe all of our objects with realistic colours. To simulate the lighting inside the fridge, use a Dome as a Key light set to an orange. Add five Area lights, represented in pink. To simulate light bounces in such a small, confined space, as well as to give it a sense of being wet and gelatinous, add several Point lights that only affect the Specularity. Last of all, add a Linear light, which will highlight the rims of the suction cup.



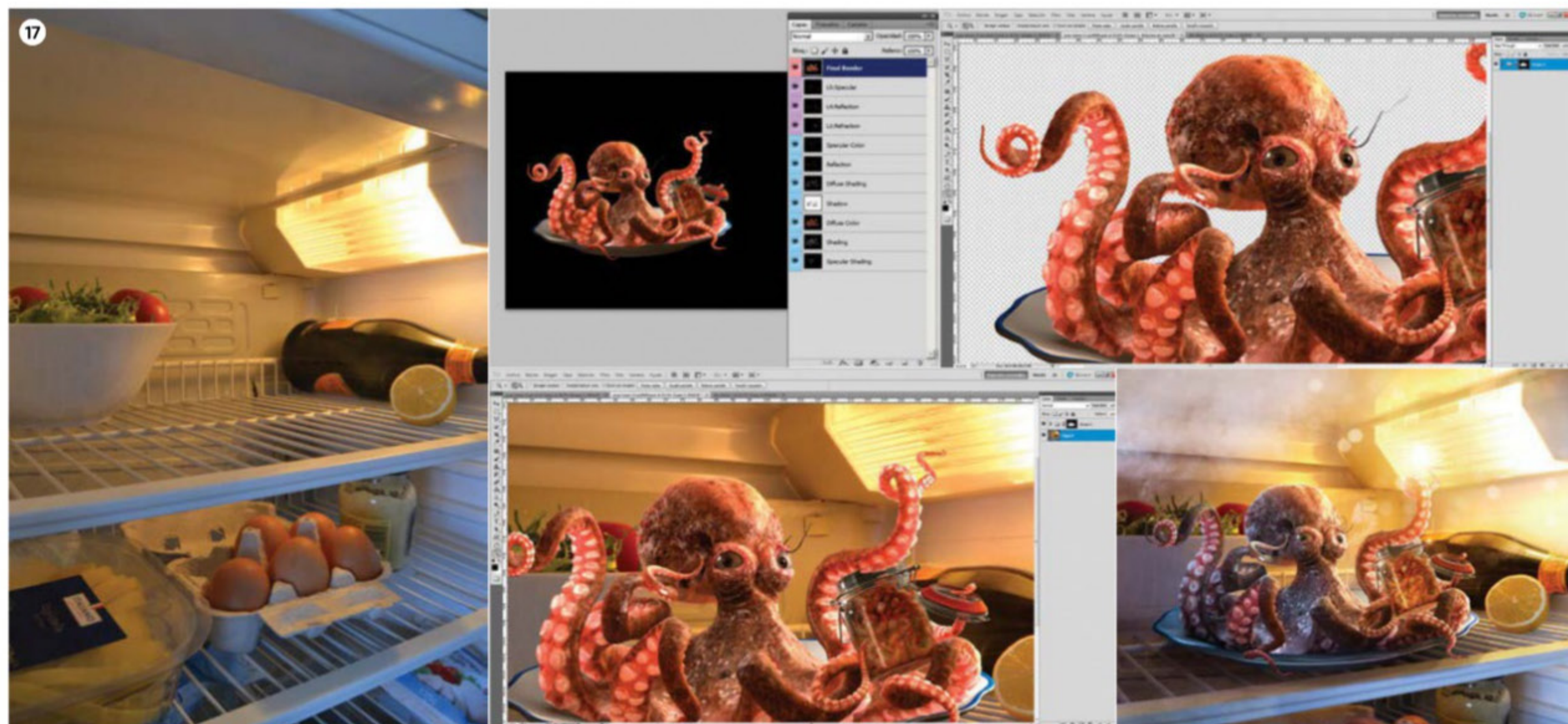
The studio • Merge 3D with photography



15 Render in Layout Render times vary greatly depending on the hardware at hand. It took 26 hours to render this image on a machine with eight cores and 12GB RAM. It sounds like a long time, but it is a very high-resolution image (6,000 x 5,000 pixels, which is 32-times as many pixels as a 720p HD image) and if you consider that I used four Area lights and subsurface scattering on a 3 million-polygon scene, it's actually not that bad. These are my render settings, where I tried to find a decent compromise between quality and render time.



16 Export as a PSD PSD Export is my favourite way of exporting render pass layers out of LightWave. It enables us to save all the assigned passes to a single PSD file. This tool can be found in Layout in the Processing window. Click on Add Image Filter and choose Photoshop PSD Export from the list. If we click on the newly added filter, we will see the PSD Export options where we can choose which passes we want to render, as well as the path for saving the PSD file.



17 Do any final tweaks Besides the passes available on PSD Export, I manually generated a Fresnel pass, an Occlusion pass, a Depth pass and an ID pass. We can now access this selection, taking advantage of the Alpha that's in the Channels tab, enabling us to create a layer mask. Now our octopus has been cut out and we can place and adjust the background image on a layer underneath. If we did a good job in the lighting stage, the background should be fairly similar in terms of colour, and it should blend with the octopus almost seamlessly. We can then add a cooling photo filter to adjust the left section of the image that should not be getting so much of the warm light coming from the fridge light. We could also simulate a cold effect using brushes and images of smoke. Last of all, adjust the levels to give it more contrast and a noise filter to better integrate the 3D elements into the background image.

Post-production tips

As well as the passes available when you export as a PSD, we can manually generate a Fresnel pass, an Occlusion pass, a Depth pass and an ID pass. We could also use a Cold photo filter in Photoshop to emphasise the cooler nature of the character and the environment in which it's placed. To create a slightly more-surreal vibe to your image, feel free to use a Glow filter in Photoshop, or you could use a plug-in to achieve a similar effect.

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Technique focus

Incredible 3D artists take us behind their artwork

RENDERING For this piece I used V-Ray. I found it very flexible to render complex shaders, such as metals, satin and gloss. In this case, I created a material for each type of metal, from aluminium to screws and bolts. Every metal contains several Noise maps in the Reflection and Glossiness channels to simulate a slightly dirty look. **Benelli Sei 900cc Cafe Race**, 2014



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Country Italy

Software used 3ds Max, V-Ray, After Effects

Bio Andrea works in CG and is inspired by vintage motorcycles

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Masterclass

Gustavo Åhlén is the founder and creative director of Svelthe. He is also a professional 3D/VFX designer and matte painter for films, games and advertising

Sculpt the leg muscles in ZBrush

“In the final part of our anatomy masterclass, we will learn to sculpt the leg muscles over a skeleton”



To conclude our anatomy masterclass, we're going to focus on the creation of the leg muscles and how to sculpt them

in ZBrush. To make the process simpler, as well as the tutorial steps on the following pages, there is also a video tutorial.

In order to simplify the creation of the leg muscles, we need to break them up into four different groups. These include the hip muscles, the upper-leg muscles, the lower-leg muscles and the foot muscles. Splitting them into groups makes it much easier to understand the process, as we need to be as accurate as possible. Pay attention to how these muscles look from different angles, particularly front and side views, as well as from the back.

The muscles in the legs are generally known as long muscles, as they stretch a lot more than other muscles in the body. When it comes to sculpting them, I'd recommend using the Move or Move Elastic tools to stretch the base meshes. Once you achieve the correct muscle shape that correlates to your reference images, use ZRemesher to remesh the stretched mesh. As we've been manipulating the base mesh with the Move brush, it will have

irregular polygons, so using ZRemesher will correct it. Always work low poly with these muscles, and after ZRemeshing you can add more subdivision levels.

Sometimes it's possible to create different models with the same SubTool by maintaining different PolyGroups, but personally I prefer to split the different PolyGroups into separate SubTools. By doing this, we can avoid having to hide other PolyGroups when we want to use brushes, such as the ClayBuildup brush. This also enables us to rename each muscle

that we're sculpting – if you keep all muscles in the same SubTool, it's not possible to do this. It'll take time and experience to get the hang of properly organising projects, so really try to focus on this. If you can't manage your work, you'll forget important parts of the process.

Through the next few steps I will teach both the origin and the insertion of each muscle. The anatomy of the legs is quite complex, so have a go at drawing sketches on paper to help you understand the origin and insertion of the muscles.

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Tutorial files:

- Tutorial screenshots
- Video tutorial

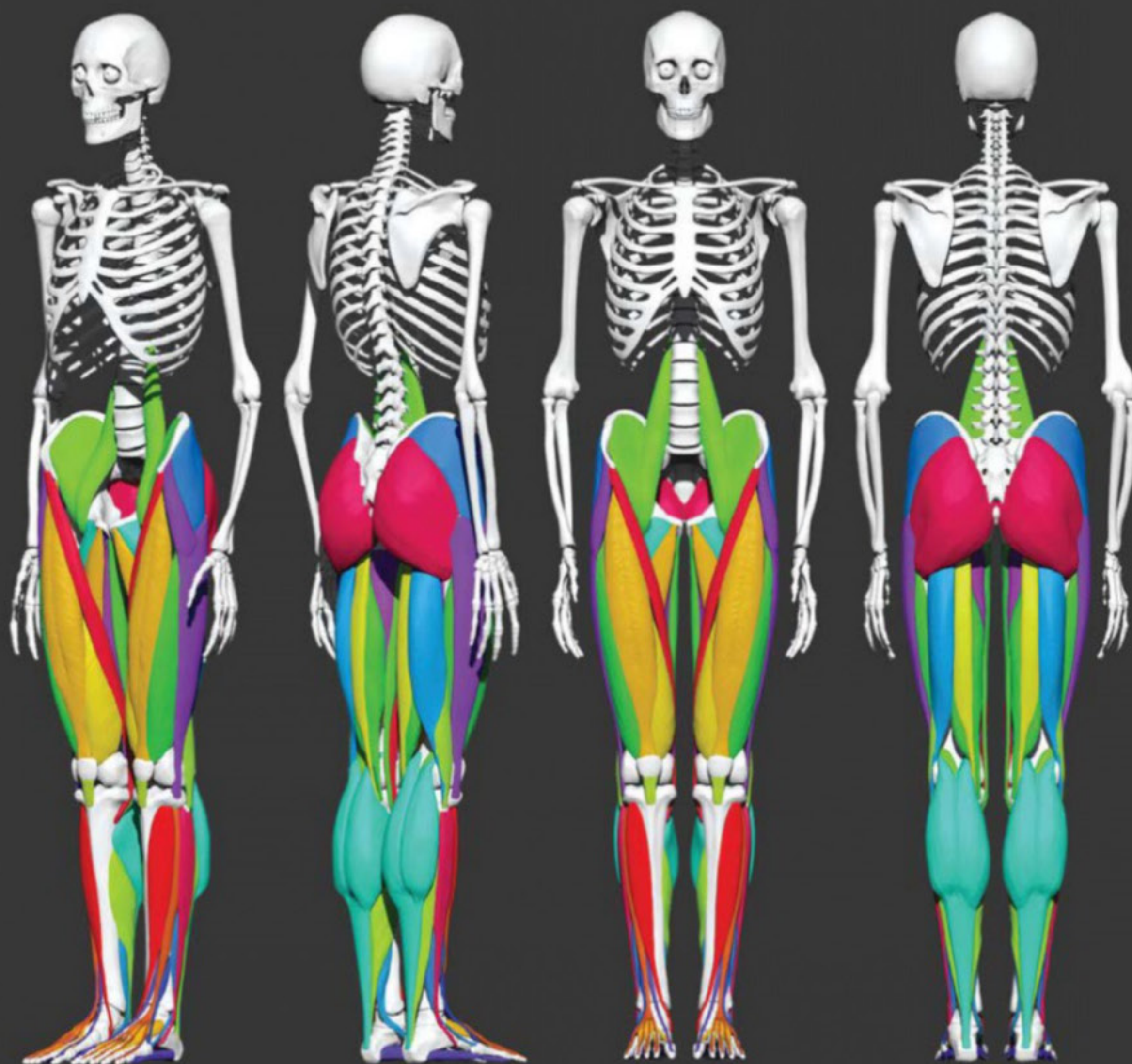
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To really understand the anatomy of the leg muscles, sketch them before you begin sculpting



Separating the muscles into different SubTools makes it much easier to organise your project



Take a look at how to sculpt the leg muscles...

01 Tensor fasciae latae and the gluteus medius

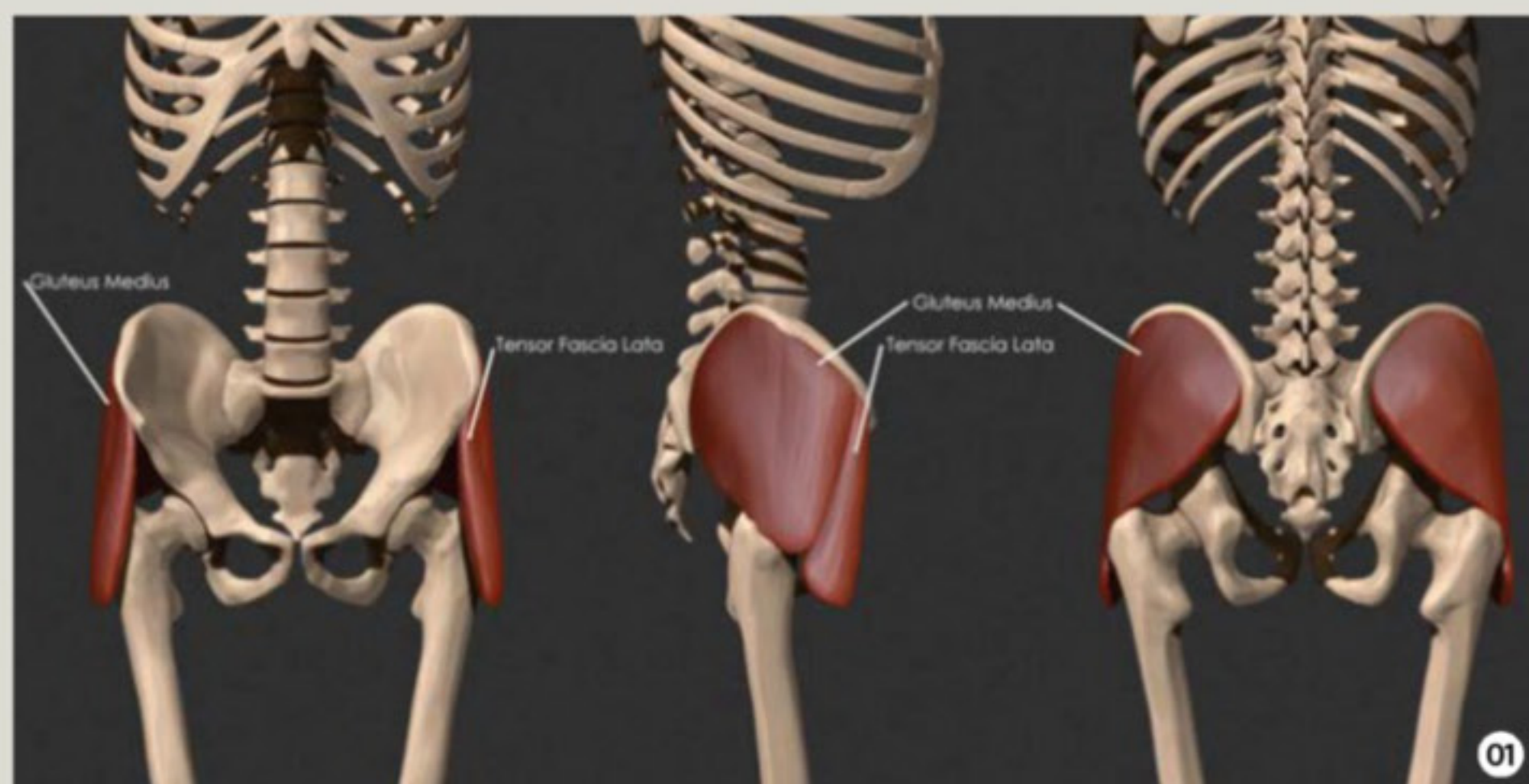
The origin of the tensor fasciae latae is located at the iliac crest and the insertion at the iliotibial tract. For the gluteus medius, the origin is located at the gluteal surface of ilium, under the gluteus maximus and the insertion is located at the greater trochanter of the femur. This is a wide, fan-shaped muscle and it's fairly thick.

02 Gluteus maximus and iliopsoas

The gluteus maximus's origin is at the gluteal surface of the ilium, the lumbar fascia, the sacrum and the sacrotuberous ligament. The insertion is at the gluteal tuberosity of the femur and iliotibial tract. The origin of the iliopsoas is at the iliac fossa and lumbar spine, insertion is located at the lesser trochanter of the femur.

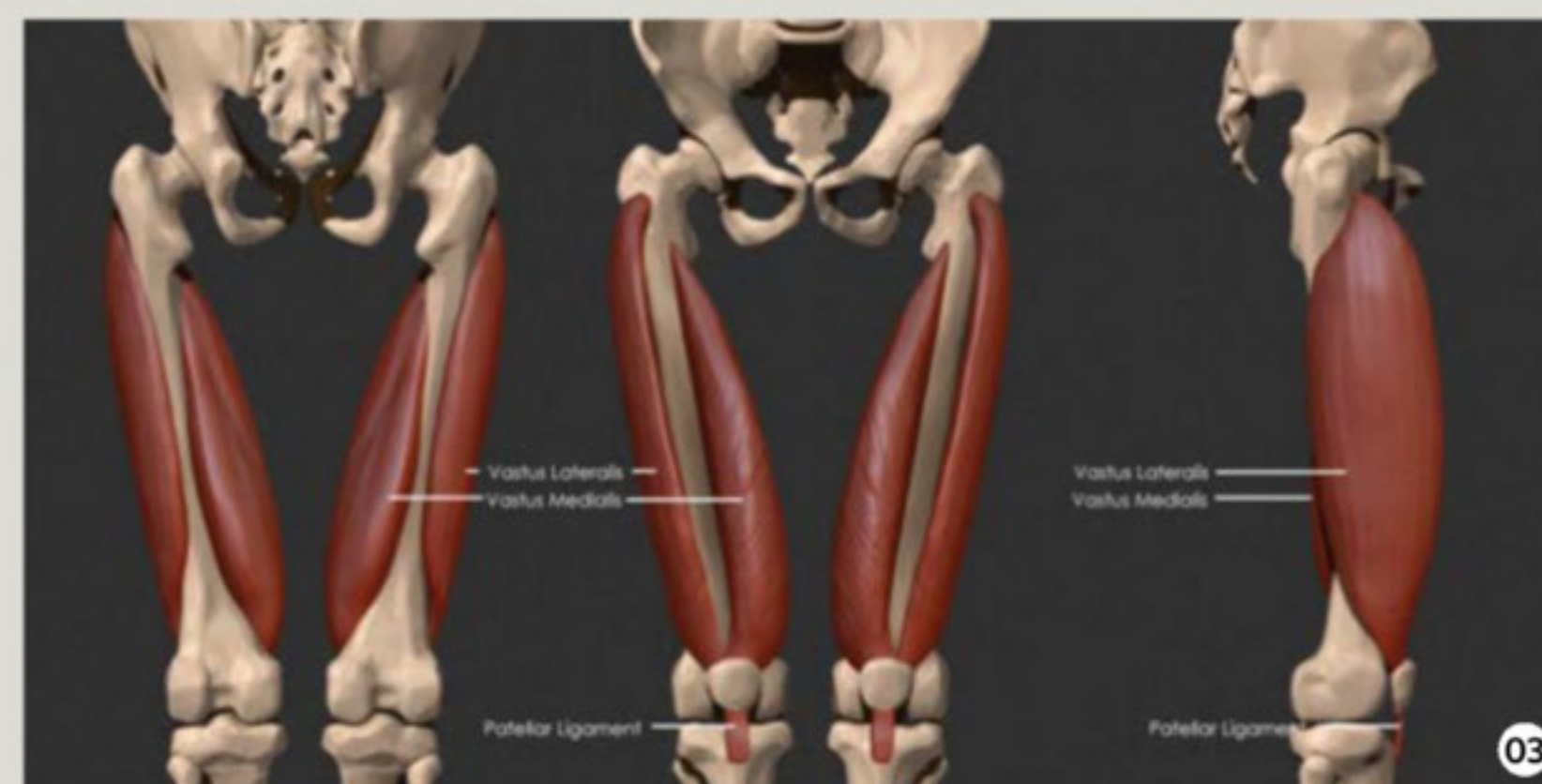
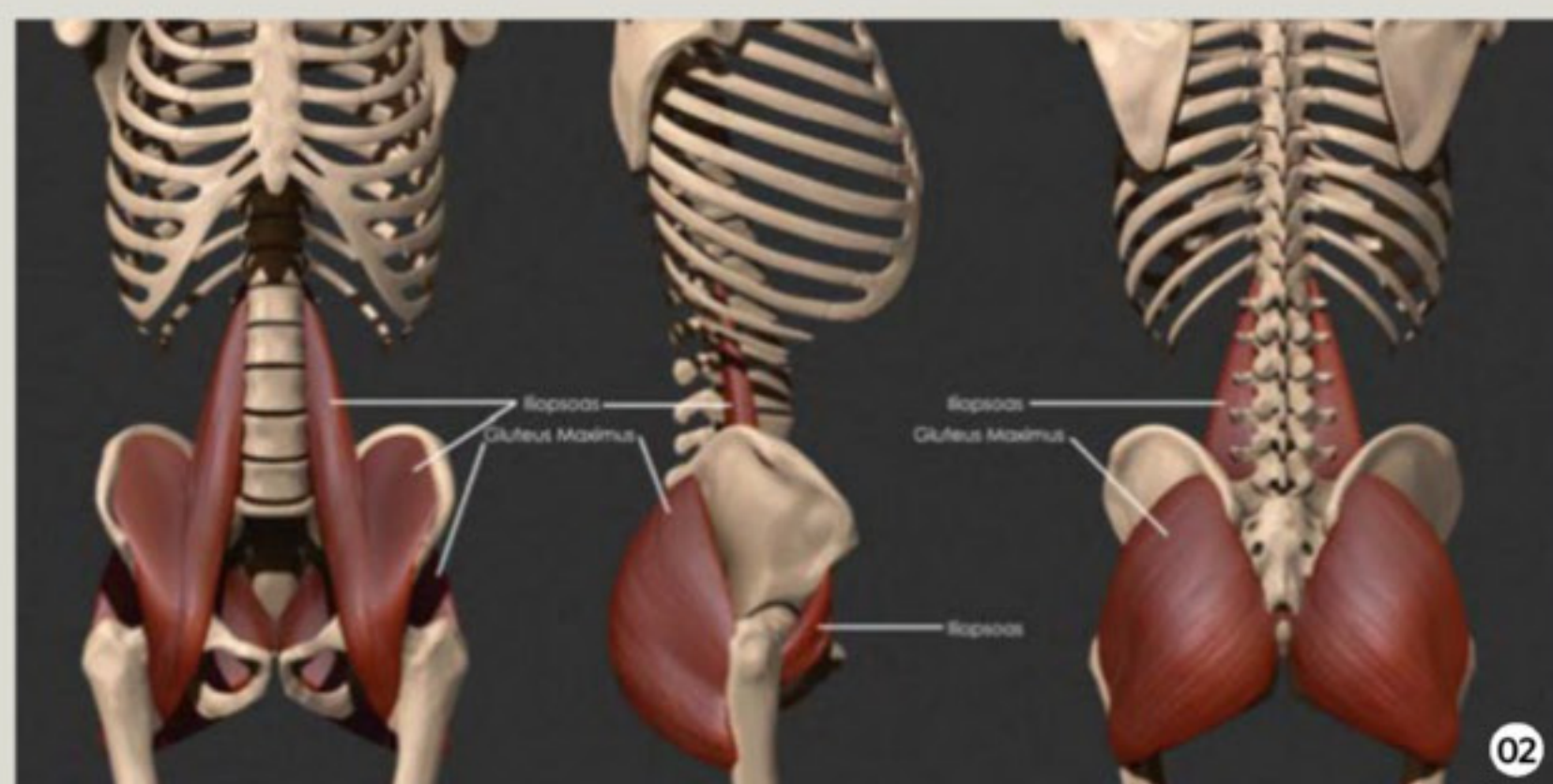
03 The vastus lateralis and vastus medialis

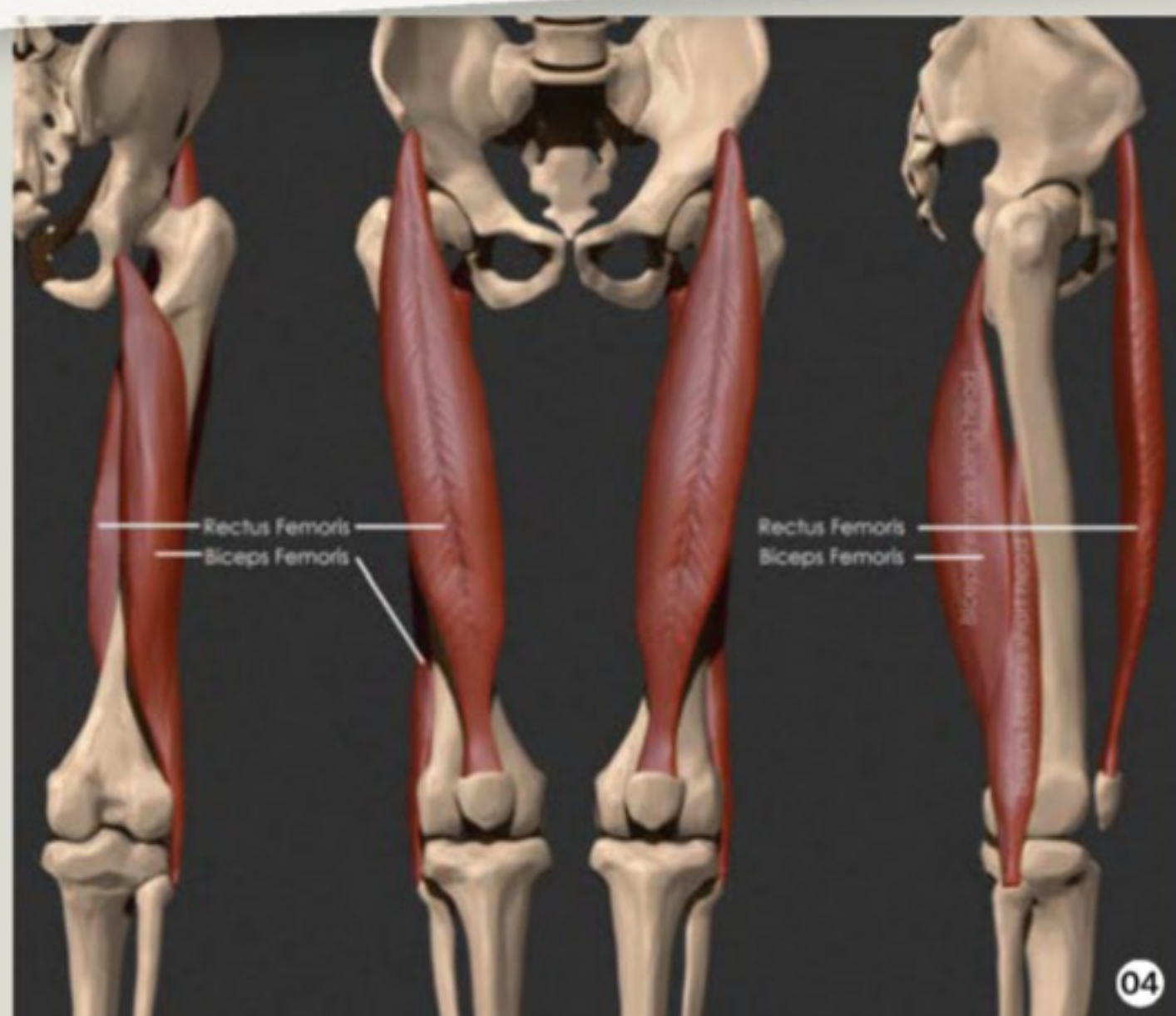
The origin of the vastus lateralis is located at the greater trochanter, intertrochanteric line and linea aspera of the femur. The insertion is at the patella via the quadriceps tendon and tibial tuberosity via the patellar ligament. The vastus medialis origin is at the medial side of femur, and the insertion is located at the quadriceps tendon.



Sculpt the foot muscles

It's crucial to take a look at the origin and insertion of the foot muscles. The extensor digitorum brevis's origin is at the dorsal surface of calcaneus, and the insertion is at the proximal dorsal region of middle phalanges 2, 3 and 4. The abductor hallucis originates at the tuberosity of the calcaneus and the insertion is at the medial aspect of base of first phalanx of hallux. Last of all, the abductor digiti minimi originates at the plantar aponeurosis and the insertion is at the fifth toe or phalanges.





04 The rectus femoris and the biceps femoris

The origin of the rectus femoris is at the anterior inferior iliac spine and the exterior surface of the bony ridge, which forms the groove on the iliac portion of the acetabulum. The biceps femoris's origin is at the tuberosity of the ischium, linea aspera, femur and the insertion is at the head of the fibula, which articulates with the back of the lateral tibial condyle.

05 Semimembranosus and semitendinosus

For the semimembranosus, the origin is at the ischial tuberosity of the pelvis (similar to the long head of the biceps femoris) and the insertion is located at the medial surface of tibia. The semitendinosus's origin happens to be located at the tuberosity of

the ischium and the insertion is at the pes anserinus (tibia).

06 The adductor longus and adductor magnus

The origin of the adductor longus is located at the pubic body just below the pubic crest and the insertion is located at the middle third of linea aspera. For the adductor magnus, the origin is at the pubis and the tuberosity of the ischium, while the insertion is located at the linea aspera and the adductor tubercle of the femur.

07 The gracilis and sartorius

For the gracilis, the origin is located at the ischiopubic ramus and the insertion is located at the tibia (pes anserinus). The origin of the sartorius is located at the inferior to the anterior superior iliac spine, while its insertion is located at the anteromedial surface of the upper tibia in the pes anserinus.

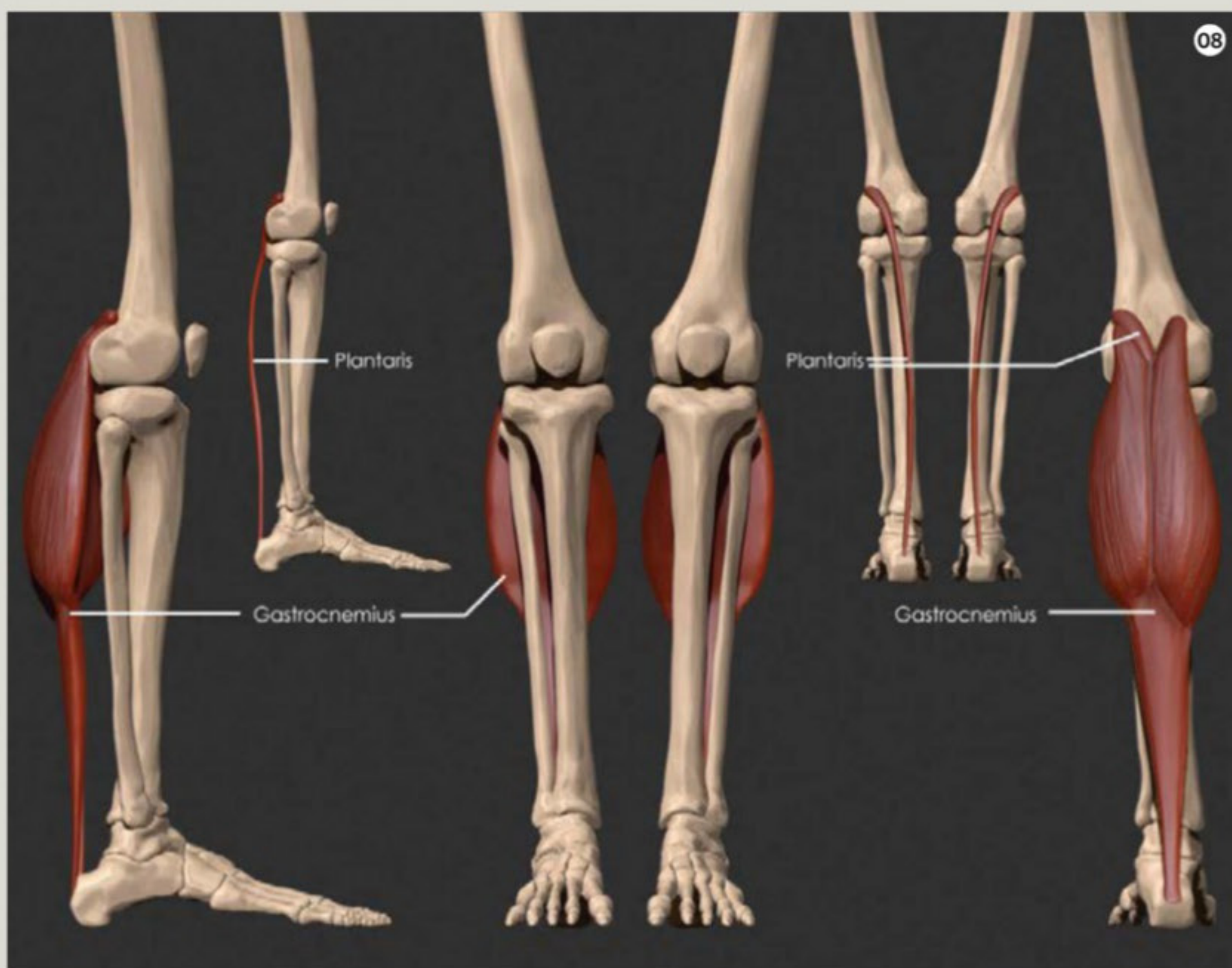
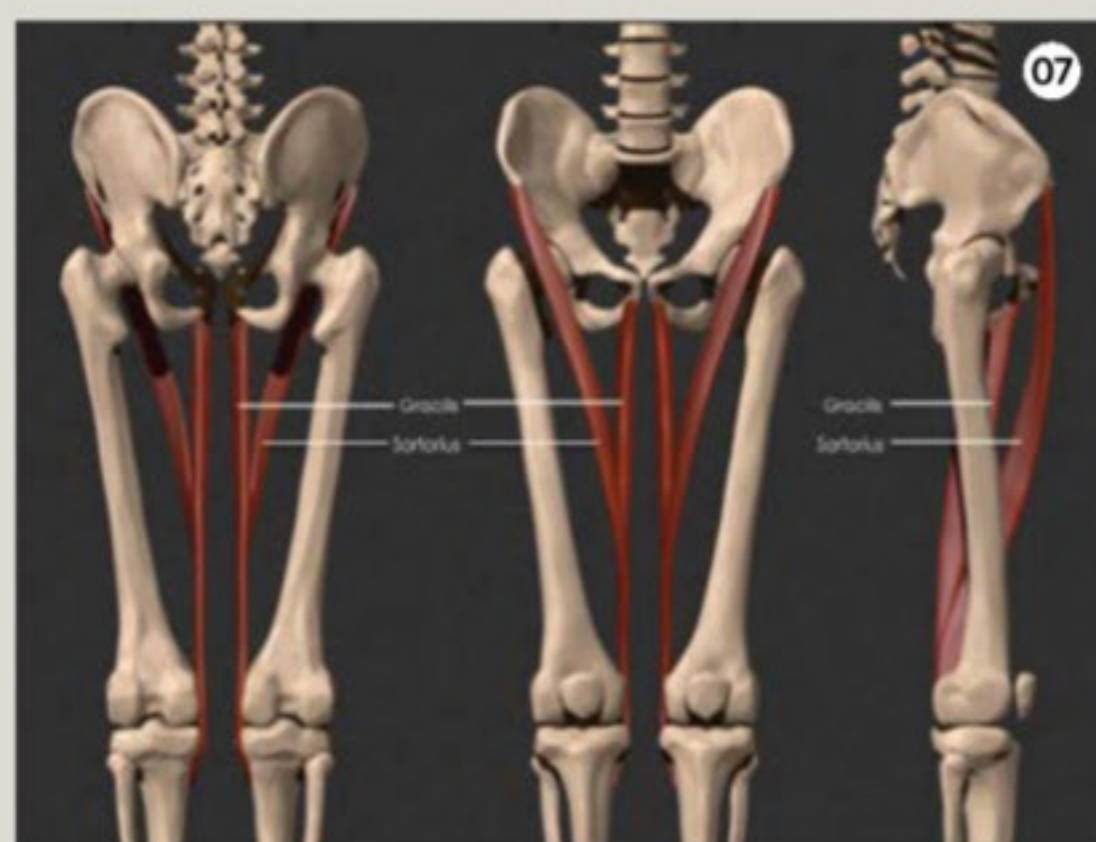
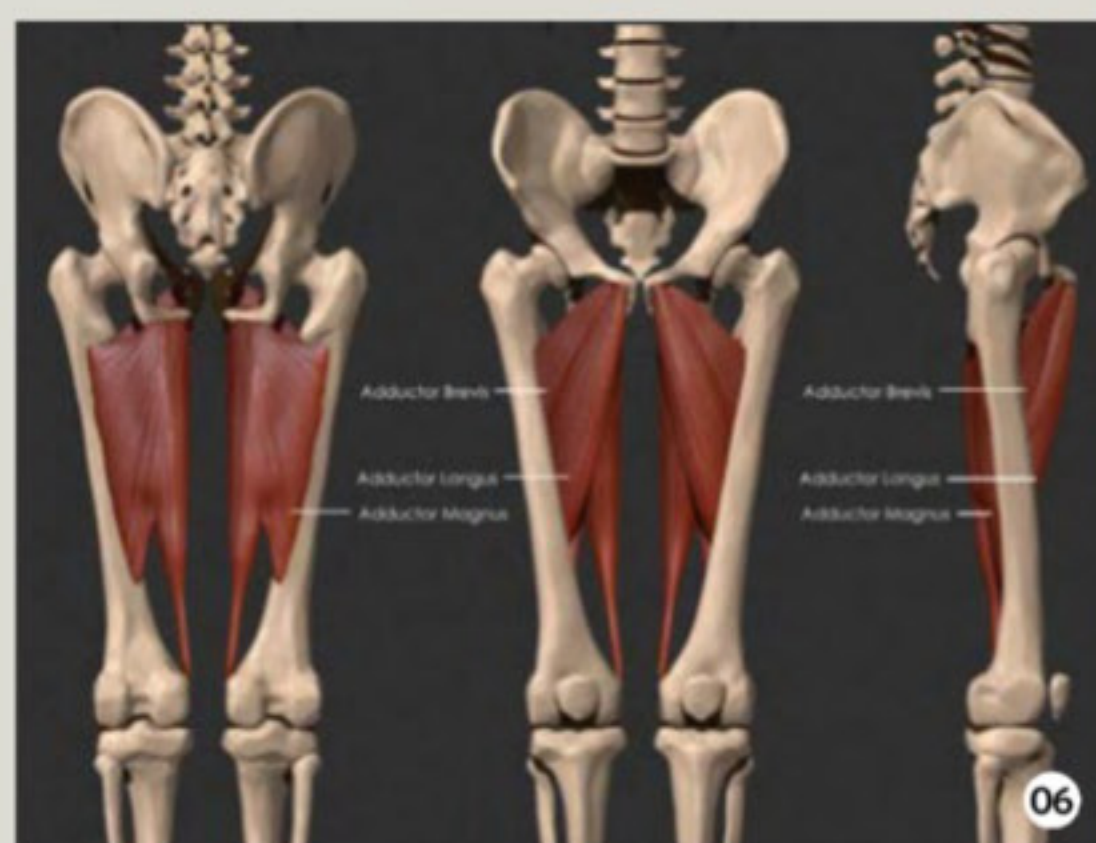
08 The plantaris and gastrocnemius

The origin of the plantaris is at the lateral supracondylar ridge of the femur above the lateral head of gastrocnemius, while the insertion is located at the tendo calcaneus (medial side, deep to gastrocnemius tendon). For the gastrocnemius, the origin is superior to the articular surfaces of the lateral condyle of the femur and the medial condyle of the femur, while the insertion is at the tendo calcaneus (Achilles tendon into mid-posterior calcaneus).



Create the base mesh for the legs

The best way to create the leg muscles is by using ZSpheres. Go to Insert and add a ZSphere. Activate X Symmetry, then using Draw you can create the extension. First, go to Adaptive Skin and turn on Use Classic Skinning. Activate Draw and create the first extension by dragging and dropping. This process will be used in the creation of all muscles. Once you've done the first extension, separate it from the main ZSphere. Use Opt/Alt-click to hide sections from the main ZSphere and to see a preview of the final mesh, hit A.



09 The soleus and the tibialis anterior

For the soleus, the origin is located at the fibula and medial border of tibia (soleal line), while the insertion is at the tendo calcaneus. The tibialis anterior's origin is located at the lateral condyle of the tibia, lateral surface of the upper half of the shaft of the tibia, and the insertion is located at the bottom of the medial arch of the foot (medium cuneiform and first metatarsal bones of the foot).

10 The extensor digitorum longus and peroneus tertius

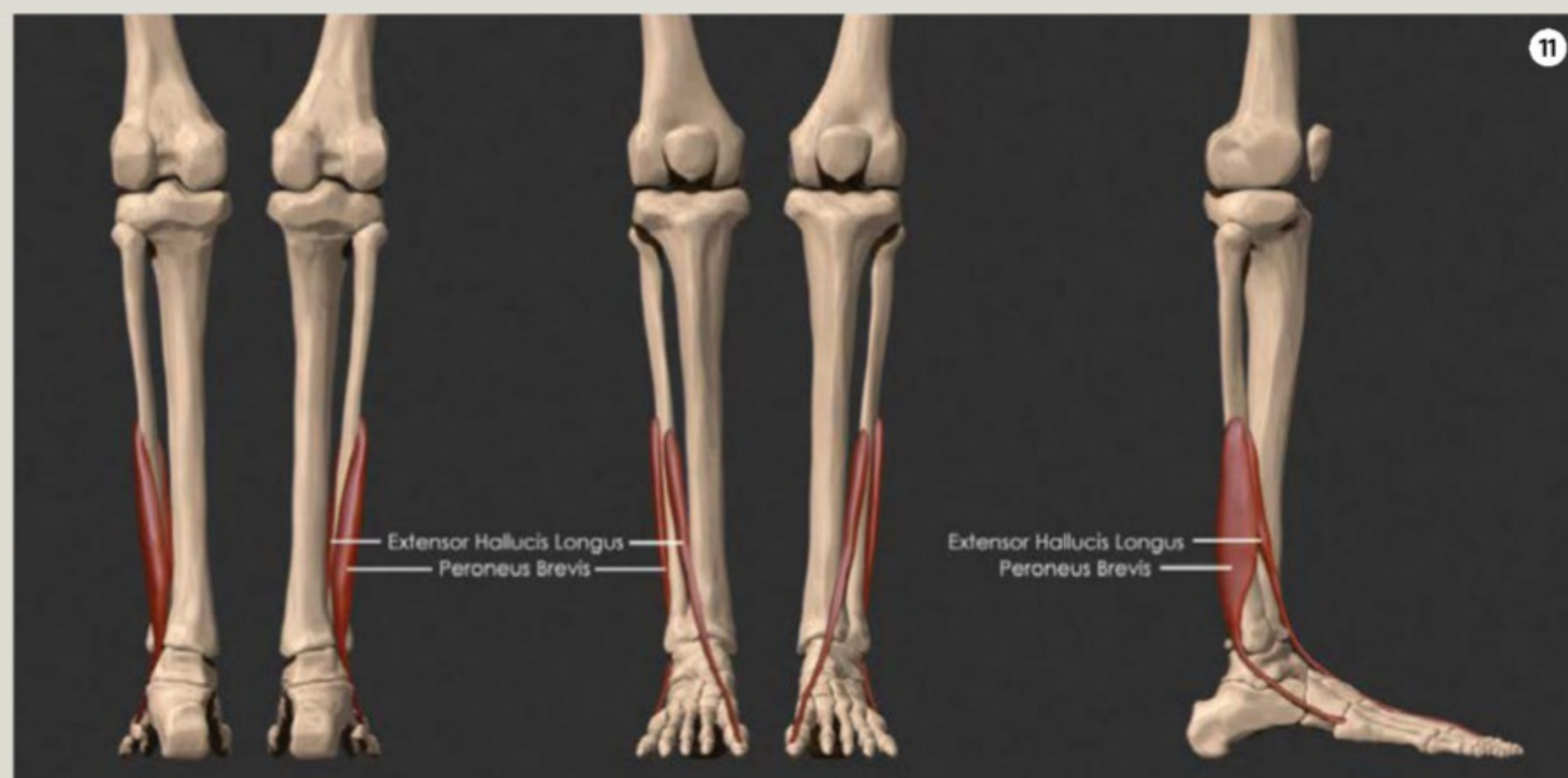
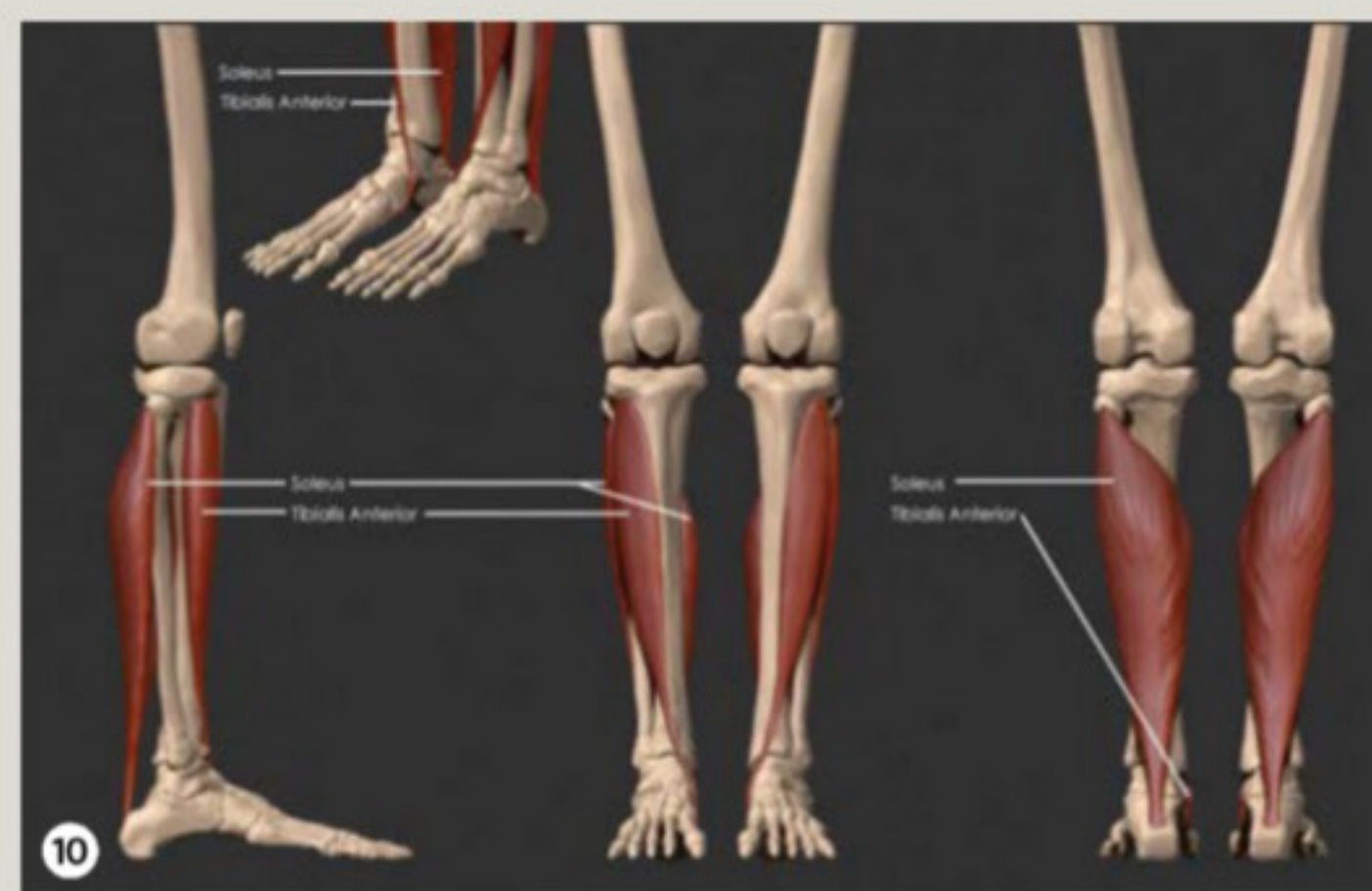
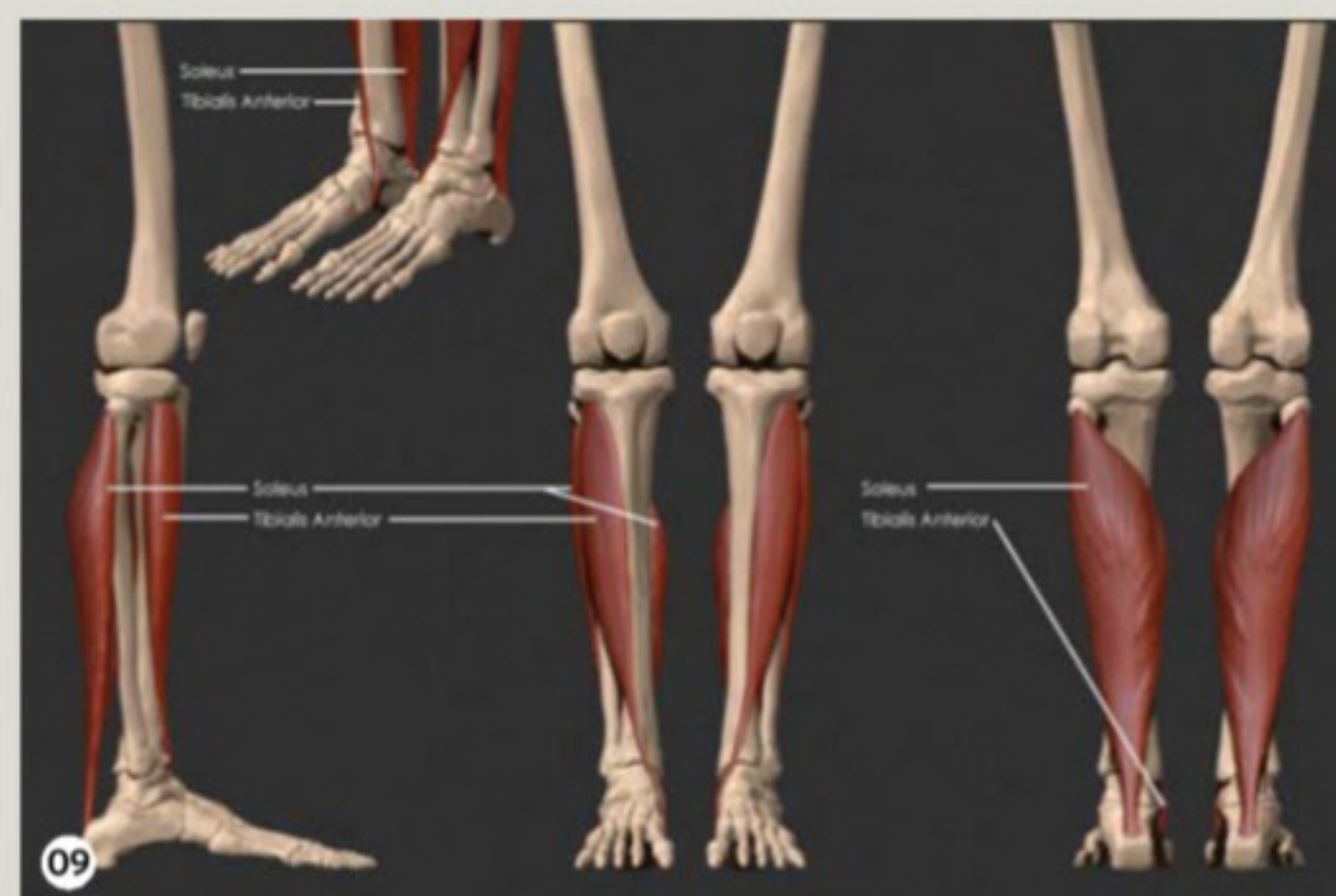
When adding in the origin of the extensor digitorum longus, you will find that it is located at the anterior lateral condyle of the tibia, the anterior shaft of the fibula and the superior three-quarters of the interosseous membrane. The insertion can be found located at the dorsal surface and the middle and distal phalanges of the lateral four digits. For the peroneus tertius, the origin is located at the distal anterior surface of the fibula, and the insertion is located at the dorsal surface of metatarsal five.

11 The extensor hallucis longus and peroneus brevis

For the origin of the extensor hallucis longus, it arises from the middle portion of the fibula on the anterior surface and the interosseous membrane, and the insertion is located at the inserts on the dorsal side of the base of the distal phalanx of the big toe. The peroneus brevis originates at the lower two-thirds of the lateral fibula and the insertion is at the fifth metatarsal.

12 The peroneus longus, tibialis posterior and FDL

The peroneus longus originates at the upper lateral shaft of fibula and the insertion is located under the foot into the base of the metatarsal bone of the big toe and into the medial cuneiform (tarsal) bone. The tibialis posterior's origin is at the tibia and fibula, and the insertion is at the navicular and medial cuneiform bone. For the flexor digitorum longus, the origin is at the posterior surface of the body of the tibia, and the insertion is at the plantar surface; base of the distal phalanges of the four lesser toes.



Techniques to sculpt muscles

Continuing from the base mesh, once you've done the ZSphere extensions, it's time to create a new separate SubTool of the muscles. Then, click on Make Adaptive Skin, which will create a separate SubTool named Skin_Zsphere. Delete the current SubTool, and go to SubTool>Insert and add the final tool Skin_Zsphere. With the help of Move or Move Topological, you can stretch this mesh, and using the ClayBuildup brush you can increase the volume of the mesh. Using TrimDynamic you can flatten some areas. Don't forget to use Backface Mask to sculpt thin muscles.



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Chris is a filmmaker based in Cardiff, UK. Trading under the moniker of United Film, he is just as happy creating 3D worlds as he is filming our own.

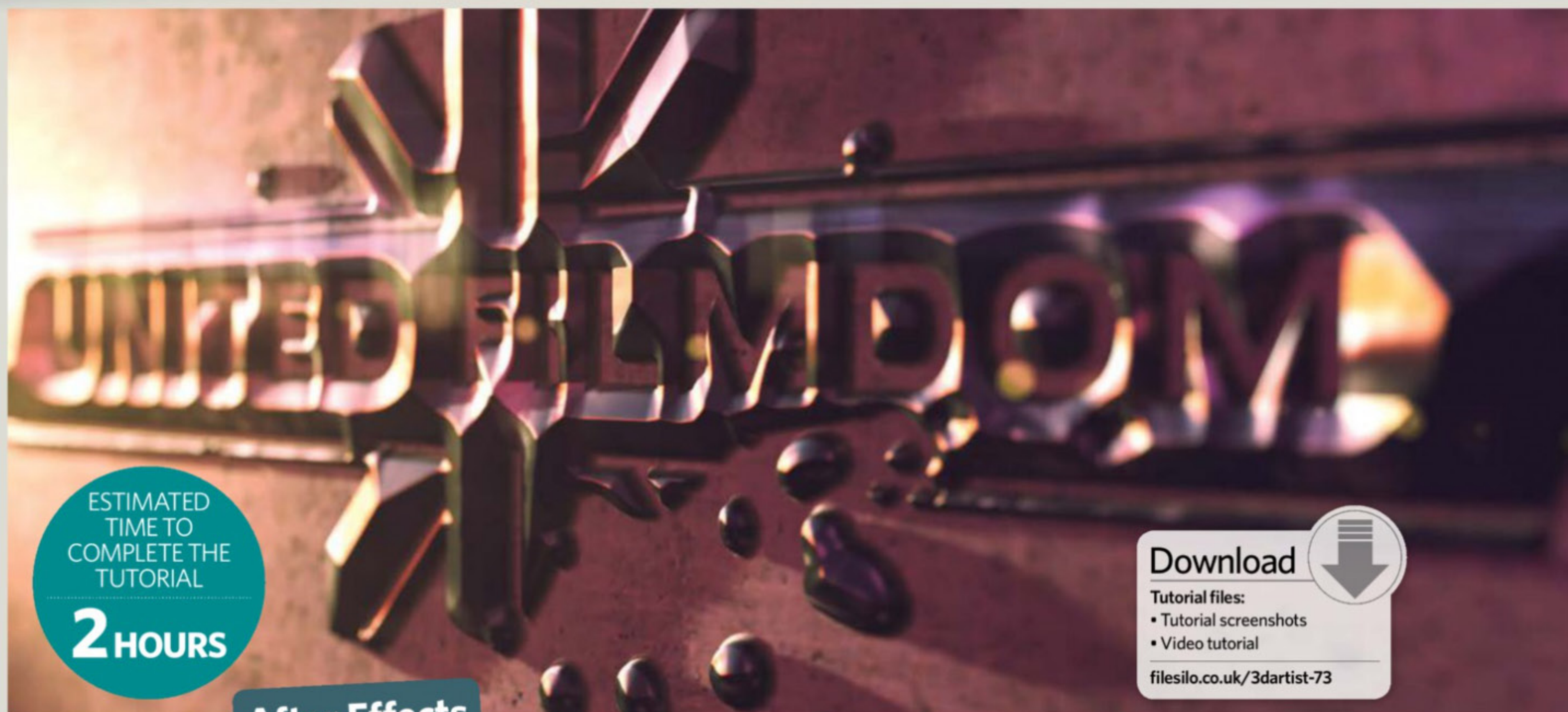
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Leticia Reinaldo

www.leticiareinaldo.com



Leticia is enthusiastic about working as a 3D artist, bringing characters and environments to life. Learn her tricks to using polypaint while sculpting on p76.

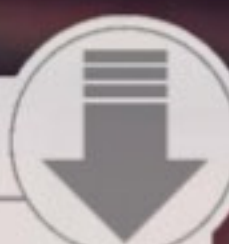


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Animate a liquid-metal logo

“How can I create a realistic-looking liquid-metal logo in Adobe After Effects?”



If you grew up in the Eighties and Nineties, you'll remember the mind-blowing liquid-metal effects that made an entire

generation believe in Skynet. In my mind, liquid metal has always been the pinnacle of cool in VFX, but it's a tricky thing to tame. Fluid simulations, effectors and containers make for unruly companions, and creating such effects has long been out of reach for most of us – until now.

Using After Effects' built-in tools, we can create a great-looking 2D animation, forming logos or any shape we want from running beads of liquid metal. With the help of Mettles' FreeForm Pro plug-in, we can take our animation to the next level, morphing it into a three-dimensional liquid-metal work of art.

The core technique is to create a flowing series of ellipses using the built-in CC Mr Mercury effect, and combining it with a Write-on technique that builds under a track matte of your logo. Through some clever nesting of compositions and a nifty use of layer styles to create a Displacement map, we can prepare a comp that is perfect for use with FreeForm Pro. This will provide a clean 3D displacement and a neat Reflection map to get that realistic appearance we want.

This project can be pretty tricky, and it's much easier to explain by demonstration, so be sure to check out the video that accompanies the tutorial. You don't necessarily need to use this technique to create liquid metals – you could just as easily make ink, blood, or even oil.



01 Prepare your ideas

Start your logo as a single vector shape in Illustrator. In After Effects, create a new comp called 'Logo' and paste your logo from Illustrator onto a Solid in your Logo comp. Next, import some textures. You'll need an HDR map, concrete for the background and a brushed-metal texture, which should be pre-comped and named 'Mercury_writeon'. Nest the Logo comp into a new comp called 'Incoming_Metal', then create a Null and use Motion Sketch to draw the liquid's path inside your logo. Now hide the Logo layer.



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02 Create the beads

Create a Solid called 'Mercury_incoming', add the Mr Mercury effect and link the Producer position to the Null position. This should mean that we're emitting mercury from the Null. Tweak the settings to create finer beads, ensuring that they don't disappear until off canvas. Add Turbulent Noise above the Mr Mercury effect, and tweak it until it looks like chrome. The next step is to copy the Null layer and paste into a new comp called 'AllMetal'. Go back to the Mercury_incoming comp and time-reverse the Null. Keyframe the mercury's Velocity and Birthrate to 0 around the two-second mark and reach its full value at nine seconds.

03 Set up the comp

Drag an instance of Logo into the AllMetal comp and stack it above the Mercury_writon layer. Set the Mercury_writon TrkMatte to Alpha. Next, add Mr Mercury again, linking the Producer to the Null position, then tweak the setting to suit your scene. I used a Velocity of -0.2, a Birthrate of 1.5, a Longevity of 20 and Gravity set to 0. Assign Resistance a rate of 0.22, set Animation to Jet, set Influencemap to Constant Blobs, Birthsize to 0.09 and Deathsize set to 1.98. Again, add a Turbulent Noise effect before the mercury effect, set as before. Add and keyframe a Vector Blur to the Logo layer so that it goes from soft to defined at around the five-second mark. Drag an instance of the Incoming_metal comp under these layers, and time-reverse it. Now the beads of metal are being sucked into the Null position and the logo is being built behind it.

04 Make it stand out

Drag AllMetal and your background texture into a new comp named 3D_comp, then into the AllMetal layer. Add Bevel and Emboss set to Soft Chisel and scale the effect to get a fine ridge. Next, add a slight Drop Shadow. Drag 3D_comp and your HDR_Map into a new comp named Main_comp, then add a camera and lights. Drag another instance of AllMetal into another comp called Displacement_map. Create a black Solid under the AllMetal layer, setting Trkmatte to Alpha. Set the Layer Style to

Inner Glow, the Technique to Precise and adjust the Size and Range to suit your animation. Add an adjustment layer with Fastblur set to 3 and Invert.

05 Adjust the lights

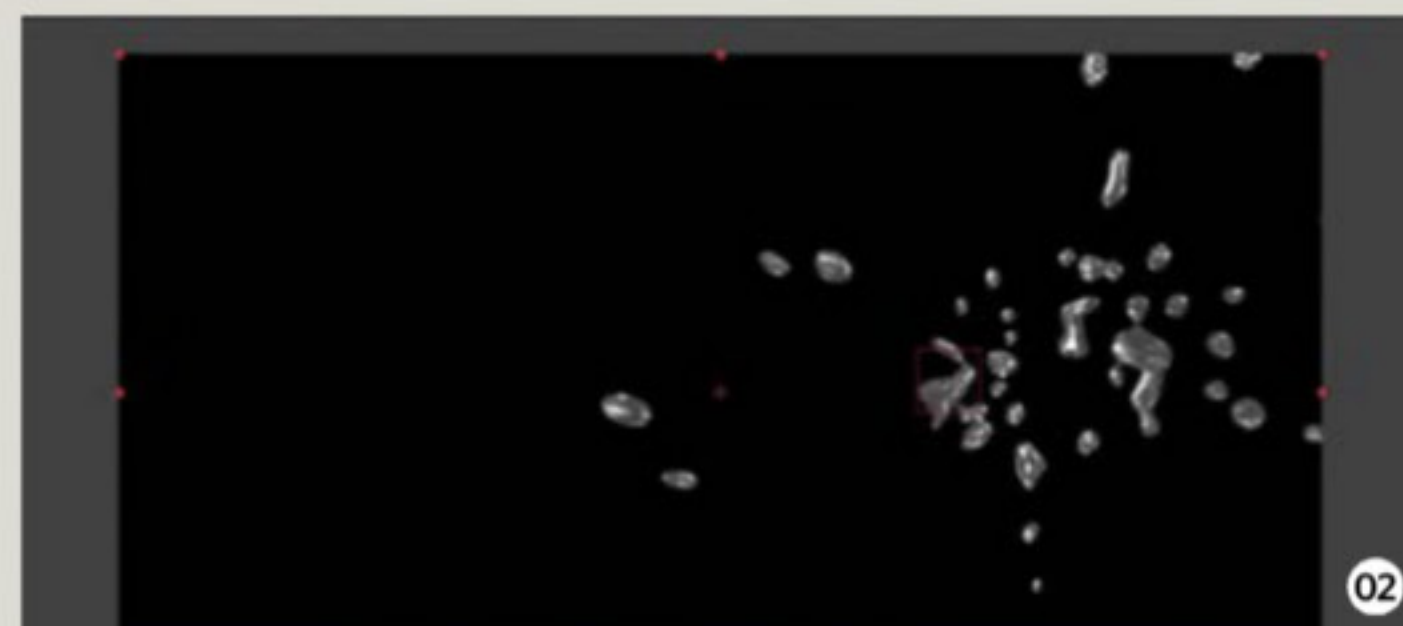
In the Main_comp, keyframe your camera move, then add the third-party FreeForm Pro effect to the 3D_Comp layer. Set FreeForm's Displacement Mapping layer to Displacement_map. We will use RGB (luma) Layers set to a Height of 30. Change Tessellation To Subdiv to 1,000, then set the Displacement Map Channels>Use For Reflection to Alpha. Set the Reflection Mapping layer to our HDR map, then adjust this mapping according to the style of map that you're using. Next, set Blending to Hard Light. Feel free to move the lights to cast long shadows from the logo, tweaking the Freeform's Material Properties.

06 Finish up

For a realistic depth of field, go to FreeForm's Render mode and set to Depth, adding the Brightness/Contrast effect. Avoid keyframing the tweak to ensure that the depth is visible throughout. Render and import this pass, then add it to the Main_comp and make it invisible. Change the Render mode back to Full and add a Camera Lens Blur effect, changing the layer to Depth_map and the Blur_radius to 86. It's best to keyframe the Blur Focal Distance throughout. To garnish, add adjustment layers with blur, flare and colour grading.

Double up

Need multiple segments of your logo to be built simultaneously? Would you like the metal to flow down two paths simultaneously? In the Project window, select the Incoming_metal comp and press Cmd/Ctrl+D to duplicate. In this duplicate, adjust the Motion Sketch path. Add this to the AllMetal comp and copy and paste the Null with the new motion path with it (but make sure this copy isn't time-reversed). Duplicate the Logo and Mercury_writon layers in the comp. Connect the Mercury_writon layers with the Mr Mercury producer to this new Null's position. Repeat as many times as necessary.



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ZBrush

Use polypaint while modelling

“What are the benefits of polypainting your work while you’re still modelling?”



Modelling a character, whether from a concept or not, is a process of getting to know your work. The more you start to

analyse shapes, lines, curves, silhouette and expressions, the more knowledge you have to help you succeed. In these steps we will introduce another great way to explore your character while modelling, which is by adding colour.

I normally polypaint my characters when I have the primary shapes blocked, so the act of painting while modelling will hopefully help you to find your character faster. This process doesn't require precision as this is not your final texture, but rather a tool to explore your character. It is also a good skill to have considering the advantage to present your product with more information about how the

character will look. Most clients really appreciate this extra input to help them visualise the model.

The steps are very simple and most importantly, very fun! We will be focusing on the eyes and face, and with this information you can develop your own techniques to polypaint any other part of your character. Make sure you have real-life reference to study colour.

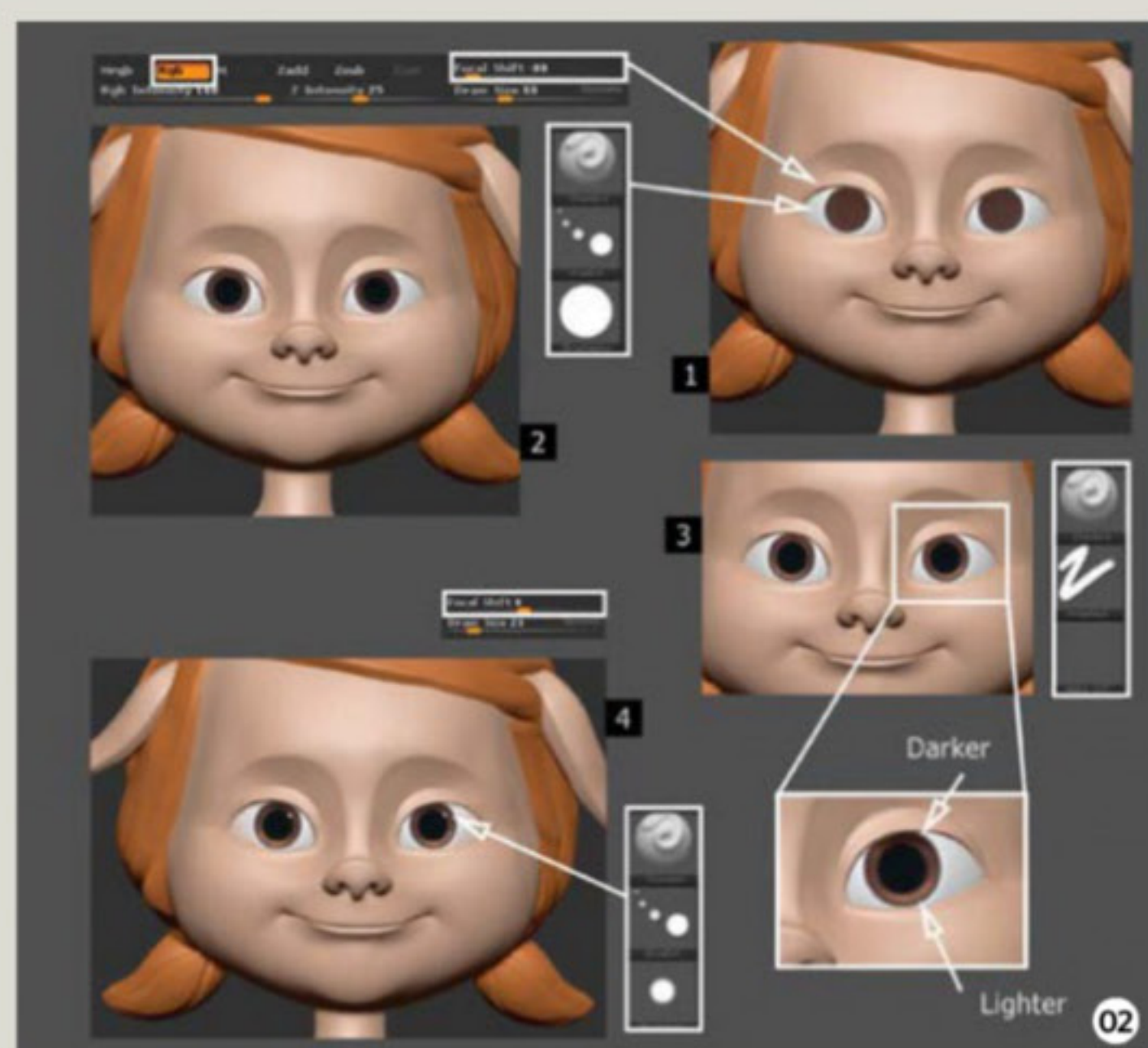
Additionally, it is good to consider other artists' work to analyse how they approach a subject similar to what you are doing. Now, let's have some fun!

01 Include a base colour

After you have the main shapes of the model defined, start off by filling the SubTools with some colour. At this point it's a good idea to play with the colour palette of



your character and give yourself time to experiment with different colours and variations. In my project I chose to use some earthy tones to introduce the idea that the character is connected with nature. To fill a SubTool, just click on Fill Object in the colour palette. Try to use a material that has no colour assigned by default. A good idea is to head into forums to find out about shaders that other artists normally use to polypaint.



02 Paint the eyes

The eyes are such an important part of the face, defining them at the start can help a lot during the process of sculpting. For my character, I chose to give her some big pupils to create a feeling of kitten eyes. On the image, label 1, 2 and 4 using the Standard brush. Make sure that you've changed the Stroke to Dragdot and an Alpha with a sharp edge. The Dragdot stroke will lock the size of the dot with the size of your brush. Also, changing the Focal Shift to a negative value will make the edge of your brush sharper. On image 3, using freehand stroke with a lighter colour, I painted the bottom of the iris and the top with a darker one.



03 Shade the face

Using the Color spray, change the Color Variance. By ensuring that Color Variance is set to a low value, you can make your colour more uniform, while a higher value will colourise the spray stroke. Setting it to a lower value from the default yields less variation. Pick your base colour and change it to a darker value, then paint the areas that are normally occluded. With a lighter value, you can paint areas that are easily exposed. Don't do it too much - we don't want it to look like the lighting is painted in the texture.



Things to remember

Don't forget to turn off ZAdd. It's probably best to separate painting and sculpting into different tasks. If, by the end of your painting, you feel like you need an overall colour shift, you can always FillObject with a low opacity. This simulates a translucent wash over your model similar to the way that traditional painters work. For a less destructive workflow, you can try to use layers. However, make sure you have RGB on before creating the layer.



04 Add blood flow

With a saturated pink or peach colour, you can start painting areas of blood flow. These areas on the face are normally the cheeks, nose, chin and ears. As this is a cartoon character, it's fine to push it and experiment with different intensities, with the intention of getting a cute result. For my character, I also painted the lips with a similar colour, just making it a bit darker. As I said before, it's good to find characters that have a similar kind of vibe and study how other artists have approach this subject.

05 Eyeliner and brows

Using the Standard brush with a freehand stroke, pick a dark colour. This type of painting requires a steady hand - it's a good idea to turn Lazy Mouse on with a big Lazy radius. The bigger the radius, the steadier the stroke will be. The eyeliner will make your character's eyes pop and as you're still modelling, it will replace the need for geometry for the eyelashes at this stage. You can use the same technique for the eyebrows. These landmarks on the face really help to establish the personality of your character. Play with the thickness and the spacing of the eyebrows - as shown in the image, it makes a big difference.

06 Create freckles

If you think it can fit your character, you should always paint some freckles. You can create freckles using a Standard brush and a DragRect stroke. Pick Alpha 07 or 08 with a low opacity, and create some random marks on the cheeks, ears, nose, chin and forehead. Personally, I prefer doing the hero freckles with no Alpha. Using the DragRect, you can drag and drop dots of different sizes on the cheeks and on the ears with more control over the placement. These kinds of high-frequency details can really help to produce areas of visual interest.



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Battle of the brands

We put four workstations from the biggest brands through their paces in our group test

REVIEWS BY Orestis Bastounis, technology writer, UK



Keeping up with computer hardware trends is a time-consuming affair.

Technology moves fast, there are dozens of components to pay attention to, and a diverse list of vendors who put them together. They range from NASDAQ-listed multinationals, to private firms run by small teams of individuals.

While most workstation vendors give comparable services, including excellent after-sales support, larger firms have the edge of being a household name.

In many organisations and establishments that order hundreds or even thousands of workstations, familiar branding often pushes the purchase decision in favour of larger, well-known companies, rather than smaller vendors. In industry, or when embarking on a 3D course at college, it's likely you'll be working on systems from the biggest names.

So what can you expect? We've narrowed the list of well-known vendors to just four: Dell, Fujitsu, Lenovo and HP. We challenged each to send us a

system. What we received were four very different 3D workstations, at a range of price points, which reflect the diversity of hardware that's out there.

They start under £1,000 with Lenovo's ThinkStation P300, up to nearly to £9,000 with HP's Z820. While every company sells alternative setups and configurations that may cost more or less than these examples, this is a great comparison to see just how much 3D performance you can expect from workstations built and sold by a global brand.

Dell Precision T5610

Dell has been making corporate desktop PCs for so long, it's become rather good at designing them. That explains why the Precision T5610 is such a great-looking business PC.

There's a diamond-grooved pattern covering the front intake fans, with a pair of handles for carrying the system – a necessary inclusion since the T5610 is really heavy. Decked in black, with four USB ports at the front and six at the rear, it has two sets of feet for vertical or horizontal orientation.

This Precision T5610 comes equipped with an Nvidia Quadro K2000 graphics card, 16GB of memory and a 2.5GHz Intel Xeon E5-2609 processor. We're used to seeing pairs of Xeon E5 chips used in really top-end systems, in dual-processor motherboards, with up to 20 cores and 40 threads in total. However, this chip runs at 2.5GHz, is a quad-core model, has no Turbo Mode speedup, and unlike other high-end Intel chips it doesn't support Hyper-threading. It's not our first choice for 3D, and has just been superseded by a newer, six-core v3 version.

The K2000 is something we're far more familiar with, and is typical in the mid-range 3D systems we review. It has 2GB of on-board GDDR5 memory and 192 shader cores. Although there are five versions of the T5610 with varying configurations and prices, Dell allows surprisingly little configuration in this version. You're stuck with the Xeon E5, and you can't upgrade the graphics. Windows 7 seems to be mandatory as well, with no option for 8.1. You get more flexibility with the pricier dual-processor version of the T5610.

The storage can be upgraded though. Dell offers larger hard disks and an SSD, although our review sample came equipped with just a 1TB hard disk. We can see why – in corporate

environments, those who make purchasing decisions aren't likely to consider the fast boot times and application performance that you get with an SSD.

In benchmarks the Precision T5610 performs predictably better in graphics tests than in CPU-bound software. The ArionBench GPU score of 295 is double that of the Quadro K600 in Lenovo's ThinkStation P300, and Cinebench 15 chugs along merrily at a reasonable 55fps.

However, the CPU results suffer due to the Xeon's relatively low clock speed and lack of Hyper-threading – not just the middling Cinebench results, but lower 3ds Max rendering times (the Underwater scene took eight minutes, almost twice the times managed by more-modern chips). The Xeon E5-2609 is even more affordable than most Xeon processors, but is underpowered – an odd choice, considering the Precision T5610 is fine in every other respect.



System info

Price: £1,479 (approx. \$2,422 US)
www.dell.co.uk

TECHNICAL SPECIFICATIONS

- Intel Xeon E5-2609 v2 processor (2.5GHz, four cores, four threads)
- 16GB DDR3 memory
- Nvidia Quadro K2000 graphics card
- 1TB hard disk

The good & the bad

- ✓ Beautifully designed case
- ✓ Sufficient memory for medium-complexity rendering jobs
- ✓ Quadro K2000 sufficient for most tasks
- ✓ Functional either horizontally or vertically
- ✗ CPU woefully underpowered compared with competition

Our verdict

Features 7/10
Performance 6/10
Design 8/10
Value for money 7/10

“Dell's T5610 is let down by its lacklustre processor performance that affects tasks”

Final Score 6/10



HP Z820

HP took our challenge very seriously, which is why it sent in a workstation that aims for the very top of the price and performance food chain. It doesn't compete with the other vendors' entries, but it's similar to the really high-end systems we've seen in the last few months, such as Scan's 3XS GW-HTX35.

Dual 3.4GHz Intel Xeon E5-2687W chips offer a total of 16 physical cores, with an Nvidia Quadro K6000 graphics card and 64GB of ECC memory rounding off a mighty specification. There's the option of a Tesla card for additional horsepower, but we opted to leave it out to keep the price down.

This type of workstation configuration is likely to be used in environments where delays to a complex project from long render times prove more costly than the hardware itself. Shaving hours off final renders can make such a difference when deadlines approach.

HP's custom-designed chassis has handles to lift it up, with grooves along the front and back of the case. It's a beast of a computer. The metal side panel comes off with a simple mechanism, and there's a lock on the side to prevent anyone helping themselves to the expensive components. Inside, removable plastic guards cover the internals. Drives can be added and replaced easily.

There's an Intel 300GB SSD, a 3TB hard disk, and a second 512GB Samsung XP941, a



PCI-Express SSD labelled the Z Turbo Drive. This is a tiny module that uses the M.2 connector, which delivers fast performance. We measured 1,063 MB/s sequential read speeds and 885 MB/s write speeds – useful for storing project data or as a scratch disk.

As we've found in the past, the ideal chip for high-end 3D work combines plenty of cores with fast clock speed. The eight-core 3.4GHz Xeon E5-2687W undoubtedly fits this description, because it can really drive multithreaded software, with a high clock speed too, unlike the 10- or 12-core Xeon chips that run below 3GHz.

Combined with the Quadro K6000, the Xeon chips really flex their muscle. The Underwater scene rendered in less than six minutes at 1080p, and delivered a record-breaking Cinebench 15 CPU score of 2,497.

The K6000 breaks records as well. ArionBench completed in two minutes 28 seconds, slightly faster than Scan's 3XS GW-HTX35. SPECViewPerf scores were a few points below Scan's system though.

With its excellent design, the ultra-fast performance and a great storage setup, the Z820 is a wickedly fast computer for 3D design, offering professional-class performance for those with the budget.

System info

Price: £8,983 (approx. \$14,700 US)

www.hp.com

TECHNICAL SPECIFICATIONS

- 2x Intel Xeon E5-2687W processors (3.4GHz, eight cores, 16 threads)
- 64GB DDR3 memory
- Nvidia Quadro K6000 graphics card
- 1x Intel 300GB SSD
- 1x Samsung 512GB X941 PCI-Express SSD
- 1x 3TB hard disk

The good & the bad

- ✓ Quadro K6000 drives graphics performance
- ✓ Plenty of memory
- ✓ PCI Express SSD, second SSD for operating system
- ✓ Large 3TB hard disk
- ✗ Only affordable for large studios or oligarchs
- ✗ Massive size

Our verdict

Features 9/10
Performance 9/10
Design 8/10
Value for money 6/10

“Well built, expensive but seriously powerful, the HP Z820 is a brilliant high-end workstation”

Final Score 8/10

A With two sets of rubberised feet, the Dell Precision T5610 can be placed either vertically or horizontally

B The chassis of the HP Z820 has a simplistic, elegant design, with minimal elements to distract the eye

C With all the brain in the HP, Z820, it has its fair share of brawn too, with a large case and lockable side panel

Test result comparisons

Manufacturer/Product	Cinebench 15 CPU (points)	Cinebench 15 Open GL (fps)	3ds Max Underwater (88x451)	3ds Max Underwater (HDTV)	3ds Max Studio scene (700x400)	3ds Max Studio scene (HDTV)	ArionBench score	ArionBench time
Dell Precision T5610	346	54.94	7m 58s	30m 26s	4m 40s	28m 43s	294.08	17m
HP Z820	2497	119.86	1m 40s	5m 15s	53s	5m 1s	2013.88	2m 28s
Fujitsu Celsius W530	766	92.58	3m 59s	15m 22s	2m	12m 9s	508.34	9m 50s
Lenovo ThinkStation P300	745	33.34	4m 17s	15m 58s	2m 4s	12m 50s	130.6	38m 17s

Fujitsu Celsius W530

There's no denying that the W530 looks so very unexciting. It comes in a bog-standard desktop PC tower case, which Fujitsu tried to make a little less bland by adding a splash of red around the edges, and a two-tone gradient on the lower part, a far cry from Dell or HP's designs.

Inside the cheap case, it's a shocking mess of cabling – nothing like the neat system internals we're used to seeing. Fujitsu should certainly raise the design quality. This is an expensive workstation, but it looks like a desktop tower from 2005, with no holes or compartments to tuck cables away.

Despite this, it's a great 3D performer. The Fujitsu Celsius W530 has a notably higher specification than both Lenovo's ThinkStation P300 and Dell's Precision T5610, with a higher price to match. The Intel Xeon E3-1281 v3 processor is a 3.7GHz quad-core chip, supporting eight threads. It might not handle multitasking as well as a dual-processor workstation, but it's still fast.

It also comes with an Nvidia Quadro K4000, a graphics card that's a clear leap up from the K2000. With 3GB of video memory and 768 shaders, a standalone K4000 retails for around £750, so a good portion of the budget for the

W530 has gone on this single component. Somehow Fujitsu has still managed to squeeze 32GB of system memory into the system as well, rounding off an excellent workstation specification that can tackle really detailed projects. There's a 1TB hard disk too, but no SSD.

After booting into Windows 7, the W530 presents you with the Fujitsu LaunchCenter software. This fairly ugly software links to some useful resources, such as system manuals, and the excellent DeskUpdate software that keeps drivers up to date.

Benchmark results demonstrate the raw processing power of the W530. The fast Xeon processor ensured 3ds Max completed the Underwater scene in two minutes. The Studio scene, at 1080p resolution, completed in 12 minutes. The fastest Core i7 processors have a slight performance edge over it, such as the 4GHz 4970K in Boston's 2302-7T, but they lack ECC memory support.

The K4000 flexed its graphics muscle in our tests as well. It yielded an ArionBench score of 508, completing in nine minutes 50 seconds, a clear leap over the K2000. The same picture is present in SPECViewPerf, scores roughly triple those of the Quadro K600, and twice those of the K2000.



D

System info

Price: £2,045 inc. VAT (approx. \$3,349 US)

www.fujitsu.com

TECHNICAL SPECIFICATIONS

- Intel Xeon E3-1281 v3 (3.7GHz, four cores, eight threads)
- 32GB DDR3 memory
- Nvidia Quadro K4000 graphics card
- 1TB hard disk



E

The good & the bad

- ✓ Superb CPU performance
- ✓ Excellent graphics card choice
- ✓ Plenty of memory
- ✗ Cheap, bog-standard case
- ✗ Messy internals

Our verdict

Features	9/10
Performance	9/10
Design	6/10
Value for money	9/10

“Despite its bland and uninspiring exterior, the W530 is a great all-rounder for working with 3D”

Final Score 9/10

OUR TOP CHOICE

THE FUJITSU CELSIUS W530 COMES OUT TOP ON OUR TESTS

D The inclusion of an Nvidia Quadro K4000 is a blessing for the W530, which performs wonderfully in almost all situations

E For some reason, the Fujitsu Celsius W530 has been crammed into a desktop PC tower, with all the internal wires left loose

F While the version we tested was sent from the USA and featured the compact shell, the UK version currently has a larger form

Lenovo ThinkStation P300

The P300 is a workstation with beautifully compact dimensions, usable in either vertical or horizontal orientation. Laid flat with a monitor placed on top, it looks as much like a regular office PC as a 3D workstation, albeit one with serious processing grunt.

The configuration we received had a 3.5GHz quad-core Intel Xeon E3-1241 v3 processor and 8GB of memory, with an entry-level Nvidia Quadro K600 graphics card. You can fill the P300 with up to 32GB of either ECC or non-ECC memory and there's a choice of more-powerful graphics cards too.

While our demo unit had a 1TB hard disk, there are two hard disk bays, which can be loaded with a 256GB SSD and a 2TB hard disk. Twin USB 3.0 ports, an optical drive, audio connectors and a memory card reader populate the front, while the rear offers another six USB ports. The motherboard also has some legacy connectors too – both VGA, and a serial port, useful if anyone still uses a mouse or printer they bought in 1994.

It's relatively affordable too. Although our demo unit was sent from the US, on Lenovo's UK site, we built a configuration that matched it closely, and it came to £988, and another £100 was knocked off the price with a seasonal promotional coupon. Of course, bump the graphics card up and you'll need to reach deeper into your wallet. Apparently the UK version has a slightly larger form factor, although Lenovo claims that the smaller variant will reach British soil soon.

The review sample we tested had an interesting configuration. The Xeon E3-1241 is a really fast quad-core processor. When Turbo Mode kicks in, it leaps to 3.8GHz – great for chewing through all kinds of applications, including most 3D software.

However, the K600 is a graphics card that's more about general 3D support than lightning-fast performance. It has 1GB of memory, 192 Cuda cores and 25.6 GB/s memory bandwidth, a specification that looks weak compared with larger Quadro cards.

The benchmark results confirm this story. 3ds Max is highly CPU-bound, and we got some great render times from the P300. Four minutes, 17 seconds in the Underwater scene isn't bad at all for a sub-£1,000 enterprise system. It scored 745 in Cinebench 15 too, comparable with pricier workstations.

SPECViewPerf illustrated the shortcomings of the Quadro K600. ArionBench, an Nvidia-specific benchmark tool, took 38 minutes to run, more than twice the length of time the next-best GPU took to complete the test. It's a good thing more-powerful graphics cards are available. Whether you're ordering the P300 for personal use or in volume, spending slightly more and upgrading to a K2000 will yield some real benefits.



System info

Price: £988
(approx. \$1,618 US)

www.lenovo.com

TECHNICAL SPECIFICATIONS

- Intel Xeon E3-1241 v3 processor (3.5GHz, four cores, eight threads)
- 8GB DDR3 memory
- Nvidia Quadro K600 graphics card
- 1TB hard disk

The good & the bad

- ✓ Fast Intel Xeon E3 processor
- ✓ Great small-form factor chassis with a brilliantly compact design
- ✓ Usable either horizontally or vertically
- ✓ Relatively affordable
- ✗ Quadro K600 lacks graphics grunt
- ✗ Only 8GB memory

Our verdict

Features	7/10
Performance	7/10
Design	8/10
Value for money	9/10

“An entry-level workstation that packs a great CPU, but lacks graphics performance”

Final Score 7/10

Conclusion

The top-end specification and high price of HP's Z820 workstation puts it in an entirely different league to the affordable desktops from the other manufacturers. So instead, look to the performance of top-end systems such as Scan's 3XS GW-HTX35, which has a near-identical configuration.

The Z820 comes out slightly behind in some tests, but faster in others, which we put down to a few small differences. Nevertheless, it's still one of the fastest workstations we've ever tested.

The Dell Precision T5610 is fine in most respects, bar middling processor performance. It's rare we see a component that's actually bad, but Intel's Xeon E5-2609 is a letdown. However, it demonstrates how the K2000 can cope with modest 3D loads.

The entry-level Quadro K600 in Lenovo's ThinkStation P300 isn't so good. To cut the cost down below £1,000 some hard choices have to be made. In some cases, you may not need a fast GPU. If your main rendering software depends mostly on CPU performance (we're thinking 3ds Max here, but it includes many other graphics tasks, such as photo manipulation and video encoding) this configuration of P300 will get you by. Bump the GPU up a notch and it becomes a nifty system all round.

After testing all four systems and taking prices into account, we were most impressed by the Fujitsu Celsius W530. It may look boring on the outside, but it's what's inside that counts. The 3.7GHz quad-core Xeon E3-1281 processor chewed through benchmarks much faster than the P300 or T5610, and the Quadro K4000 is a great graphics card.

This configuration is most definitely for mid- to high-end studios. The only downside to this specification is the cost, although as we mentioned before, you could easily customise the other workstations with a similar configuration. Based on the review samples, however, you could get two ThinkStation P300 workstations for the cost of one Celsius W530 – or indeed, nine of the P300s for the cost of one HP Z820.

It stands to reason that the type of establishment and its available funding will affect the configuration of workstation you use. Large studios might provide every employee with an HP Z820, perhaps with dual or even triple monitors. Schools might choose a P300 instead, and we imagine a university would kit its labs out with a range of K4000-equipped Fujitsu Celsius W530 workstations.



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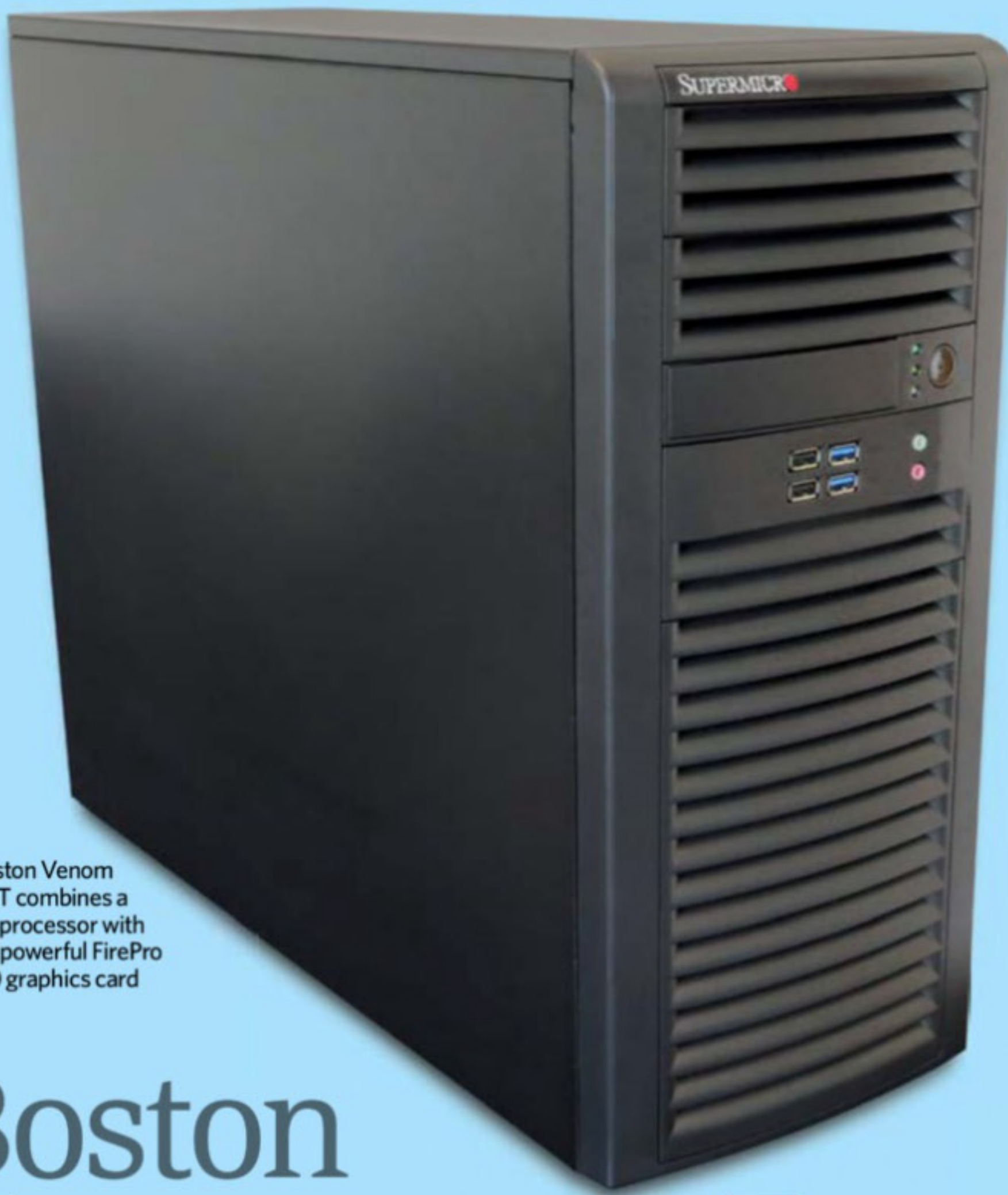
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The Boston Venom 2302-7T combines a Core i7 processor with AMD's powerful FirePro W9100 graphics card

Boston Venom 2302-7T

We take a look at a workstation with a FirePro W9100 and a fast Core i7 processor

REVIEW BY Orestis Bastounis, technology writer, UK



The 2302-7T is a mid-range desktop workstation that's coupled with a high-end graphics card, AMD's monstrous FirePro W9100.

It uses a liquid-cooled desktop quad-core processor, Intel's Core i7 4970K, which runs at 4GHz as standard, but ramps up to 4.4GHz under load.

Characterised by six DisplayPort video outputs, the FirePro W9100 is a powerful graphics card, packing 16GB of onboard GDDR5 memory, a 512-bit memory bus and 2,816 shaders.

This accounts for a large proportion of the cost of the test unit sent to us, but opting for a less high-end card, such as a Quadro K2000, could shave £1,200 off the price. With an entry-level FirePro V4900 3D card, the 2302-7T costs just £1,599 excluding VAT, but including a three-year warranty.

There are benefits and disadvantages of using desktop-grade chips for 3D work. While they may have less cores, and they can't use ECC memory, they generally run at faster speeds than Xeons, and are considerably less expensive.

The storage configuration consists of two 2TB hard disks in RAID, coupled with a 256GB SanDisk X210 SSD. The SuperMicro CZ97-OCE motherboard comes with 16GB of memory fitted, which can be upgraded to a maximum of 32GB.

Boston has used a SuperMicro chassis, with two front-mounted USB 3 and two USB 2 ports. The case is far more portable than a typical workstation case, but there's still plenty of room for expansion, and the internal design is particularly tidy, with very few visible cables.

In graphics tests, the W9100 really pushed the 2302-7T ahead of competitors in benchmarks. The score of 170fps in Cinebench is a new record, and it chewed through the detailed Luxmark scene with the highest single-GPU score we've seen at 1,390 points. Impressively, SPECViewPerf scores were very close to those managed by the pricier Nvidia Quadro K6000 in Scan's 3XS GW-HTX35 test.

While the desktop chip can't beat the CPU scores of dual-Xeon workstations, the 4GHz clock speed helps it to put in a good showing. Four minutes for the Underwater 3ds Max benchmark is still fairly quick, with 14 minutes for the longer 1080p test. The impressive Cinebench score of 834 races ahead of Intel's previous generation of Core i7 processors.

If you know your workload is going to depend heavily on graphics card performance, then the Boston Venom 2302-7T would be a better choice than a dual-Xeon system, but as it stands, it's a great workstation in its own right.

Essential info

Price: £3,999 / \$6,686 US
www.boston.co.uk/products/bos-vx9-2302-7t.aspx

OPERATING SYSTEMS

- Windows 7

TECHNICAL SPECIFICATIONS

- Intel Core i7-4790K processor (4.0 GHz)
- 16GB memory
- AMD Fire Pro W9100
- SuperMicro Z97 motherboard
- 2x 2TB hard disk
- 1x 256GB SanDisk X210 SSD



The FirePro W9100 really lifts graphics performance in some tests

The good & the bad

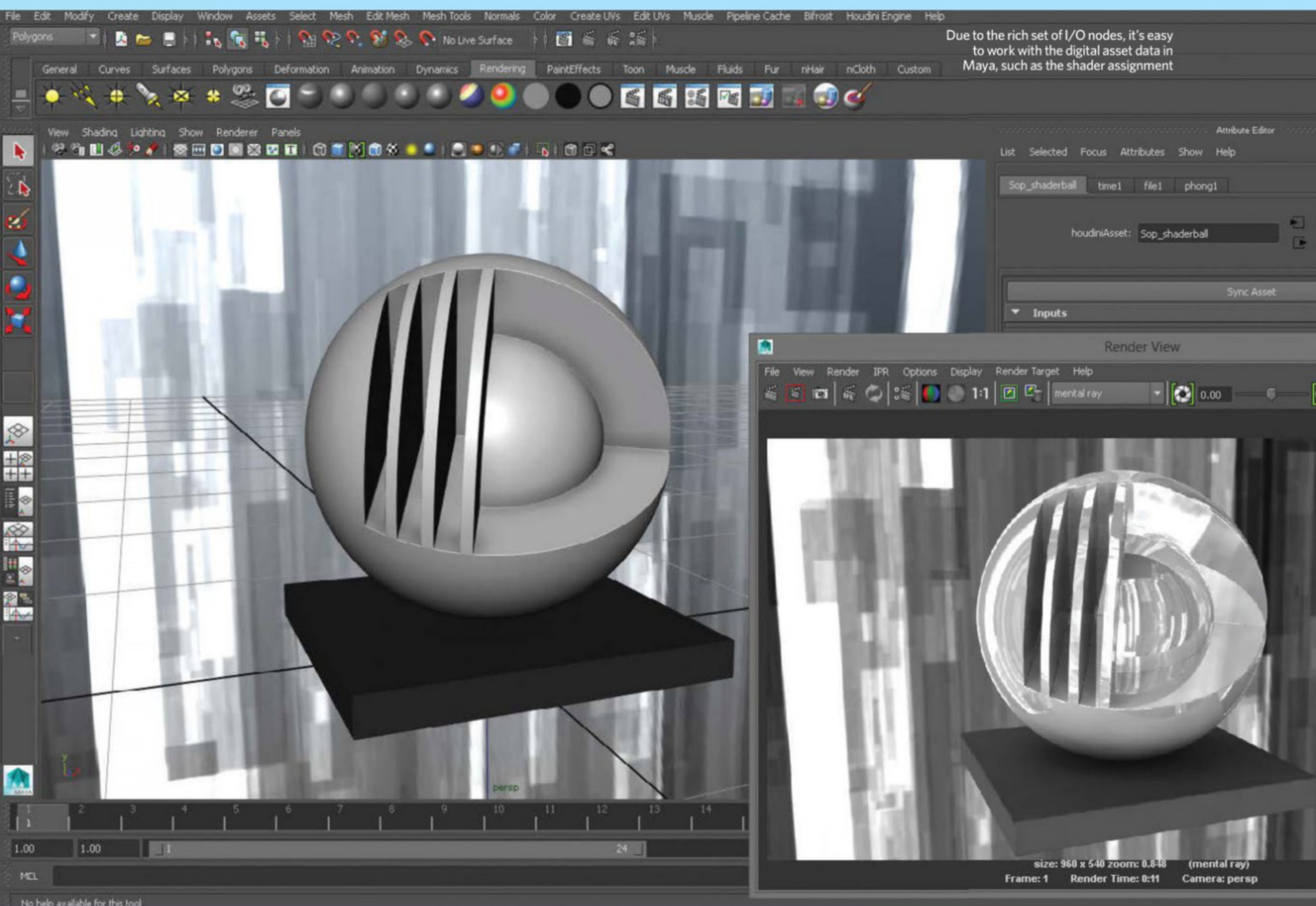
- | | |
|-------------------------------|-------------------------|
| ✓ Fast CPU performance | ✗ Limited to four cores |
| ✓ Superb graphics performance | ✗ No ECC memory support |
| ✓ Wide range of ports | |
| ✓ Plenty of storage | |
| ✓ Relatively good value | |

Our verdict

Features 8/10
Performance 8/10
Design 8/10
Value for money 8/10

“The Boston Venom 2302-7T offers good all-round results, with amazing graphics abilities”

Final Score **8**/10



Houdini Engine for Maya

Rainer Duda takes a look at Side Effects' new bridge between Houdini FX and Maya

REVIEW BY Rainer Duda, 3D graphics expert and TD, Germany



As a long-term Houdini FX user and former Houdini environment TD on feature films, it was a big surprise for me when Side Effects announced that it would be possible to use its software's digital assets within other proprietary applications.

This was particularly significant when it came to Maya, which is still one of the most widely used packages in the feature film industry today. So, what is it really like to integrate Houdini within the Maya pipeline? Let's take a look at what the Houdini Engine for Maya is capable of.

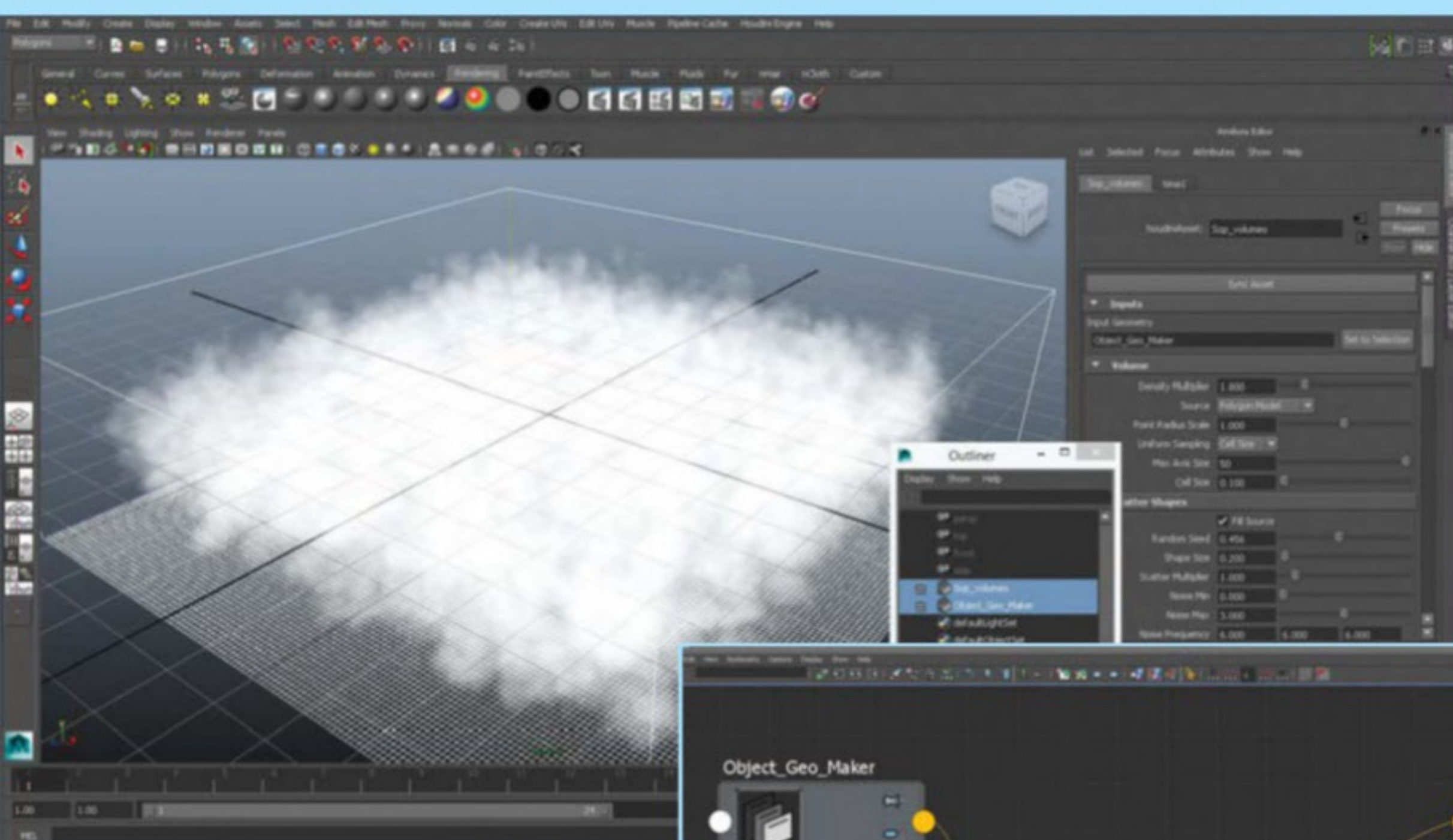
The object I brought into Maya for testing was something I'd previously made myself: a rain-generating digital asset based on particles. With this asset, the user would have the option to choose an output of either plain particles or any other geometries that were connected to each particle.

The process of importing a digital asset into Maya could have been a fairly painful experience, full of imports and exports until everything was set properly. Side Effects, however, has given users a hand in this with the Reload Asset function. If someone makes changes on a digital asset in Houdini, the

Maya user can update the asset within Maya via the Reload function, making everything flow much faster and much more smoothly.

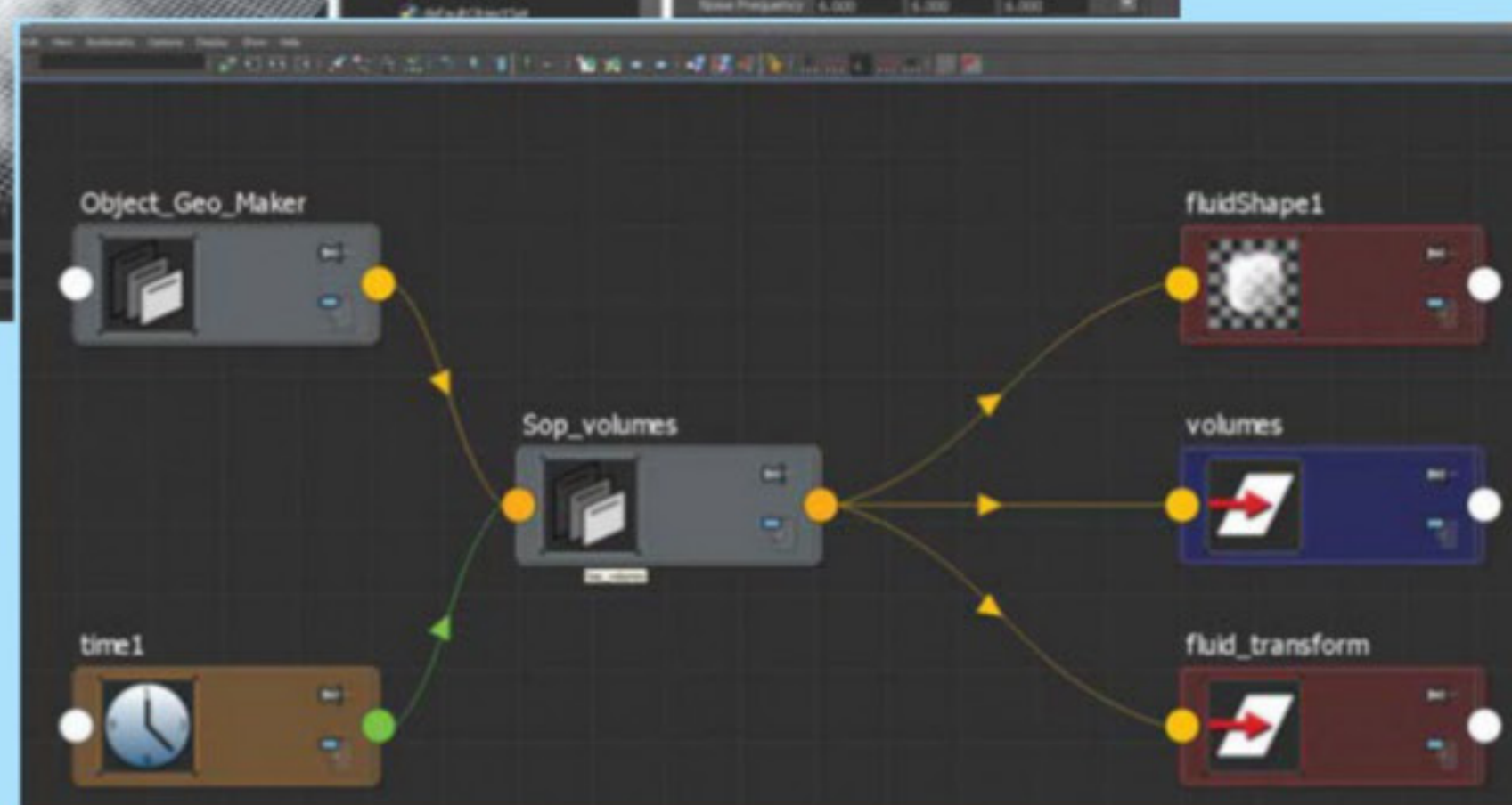
Any pure particle simulation – or any Houdini group primitives that contain only points with no face or vertices – will now be output by the Houdini Engine node as Maya nParticles, which is really quite handy for any users that are working only with particles, because it's also aimed towards not disrupting their workflow.

A crucial thing that needs to be carefully considered by users, however, is their memory footprint. My rain included meshes,



TOP/RIGHT Houdini Engine for Maya can enable users to connect multiple digital Houdini assets together with its helpful inter-asset support

BOTTOM A procedural rain made by specially designed digital assets. The appearance can be easily changed within Maya



such as cylindrical geometries and metaballs in a longer simulation, which were cached to the disc. Therefore, if you loaded the BGEO files into Maya, the memory footprint would be at least twice as large as in Houdini. Anyone interested in using Houdini Engine should take care that they have a good workstation to counteract this.

Other cool features that I discovered in Houdini Engine for Maya included the ability to directly access the Orbolt asset store via the Houdini Engine menu in Maya. This enables users to either buy or download finished digital assets for their scenes. Assets

that have already been downloaded and/or bought from the store can also easily be accessed in the Orbolt asset browser on the menu as well.

Besides that, a real beauty in terms of functionality for me was the so-called inter-asset support. With it, users can use multiple digital Houdini assets inside Maya and then be able to combine them.

Overall, I would say that Houdini Engine for Maya is definitely – even at this early stage – a massive enhancement within a professional production, and this level of integration is incredibly beneficial.

Essential info

Price: \$499 US
approx. £308
 (Node-locked licence for commercial use)
\$99 US
approx. £61
 (Indie version with workstation licence)

www.sidefx.com

OPERATING SYSTEMS

- Mac OS: 64-bit Intel-based Mac with OSX 10.7+
- Windows: 7 SP1, 8, 8.1 (32 or 64 bit)

OPTIMAL SYSTEM REQUIREMENTS

- 8GB RAM and a 64-Bit OS
- Quad Core processor or better
- At least 1 GB free hard disc space
- Workstation-class OpenGL graphics cards, such as Nvidia Quadro or AMD FirePro

MAYA VERSIONS SUPPORTED

- 2012-2015

The good & the bad

- | | |
|---|---|
| ✓ Extremely useful for particles and fluids | ✗ Houdini Engine is not stand-alone |
| ✓ Inter-asset support within Maya | ✗ Houdini Apprentice digital assets are not supported |
| ✓ Rich set of I/O nodes | ✗ Large memory footprint with big simulations |
| ✓ Assets from Orbolt can be used | ✗ Limited handling with character rigs and fur |
| ✓ Large number of batch processes | |

Our verdict

Features 7/10
 Ease of use 9/10
 Quality of results 8/10
 Value for money 8/10

“Houdini Engine for Maya is a real enhancement for any professional VFX pipeline”

Final Score 8/10

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Book Of Life

We speak to director Jorge Gutierrez on how Reel FX created the vibrant world of Mexican folklore with producer Guillermo del Toro

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“In the beginning there was a lot of hesitation, but slowly we started cooking together and sure enough, all these limitations became our strengths”

Jorge Gutierrez, Director. Page 92

The Queen Book Of Life

In this new animated film, a young man named Manolo is torn between pursuing his love and fulfilling the expectations of his family

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The latest update to Cinema 4D includes the new PolyPen tools, which the company is calling a Swiss knife for modellers that enables users to paint polygons in 3D space

Maxon presents new Cinema 4D

Features include a PolyPen modelling tool, Motion Tracker and Multi-Layered Reflectance

Internationally debuted for IBC this year, Maxon's new Cinema 4D R16 showcases several exciting innovations in addition to a huge variety of workflow enhancements.

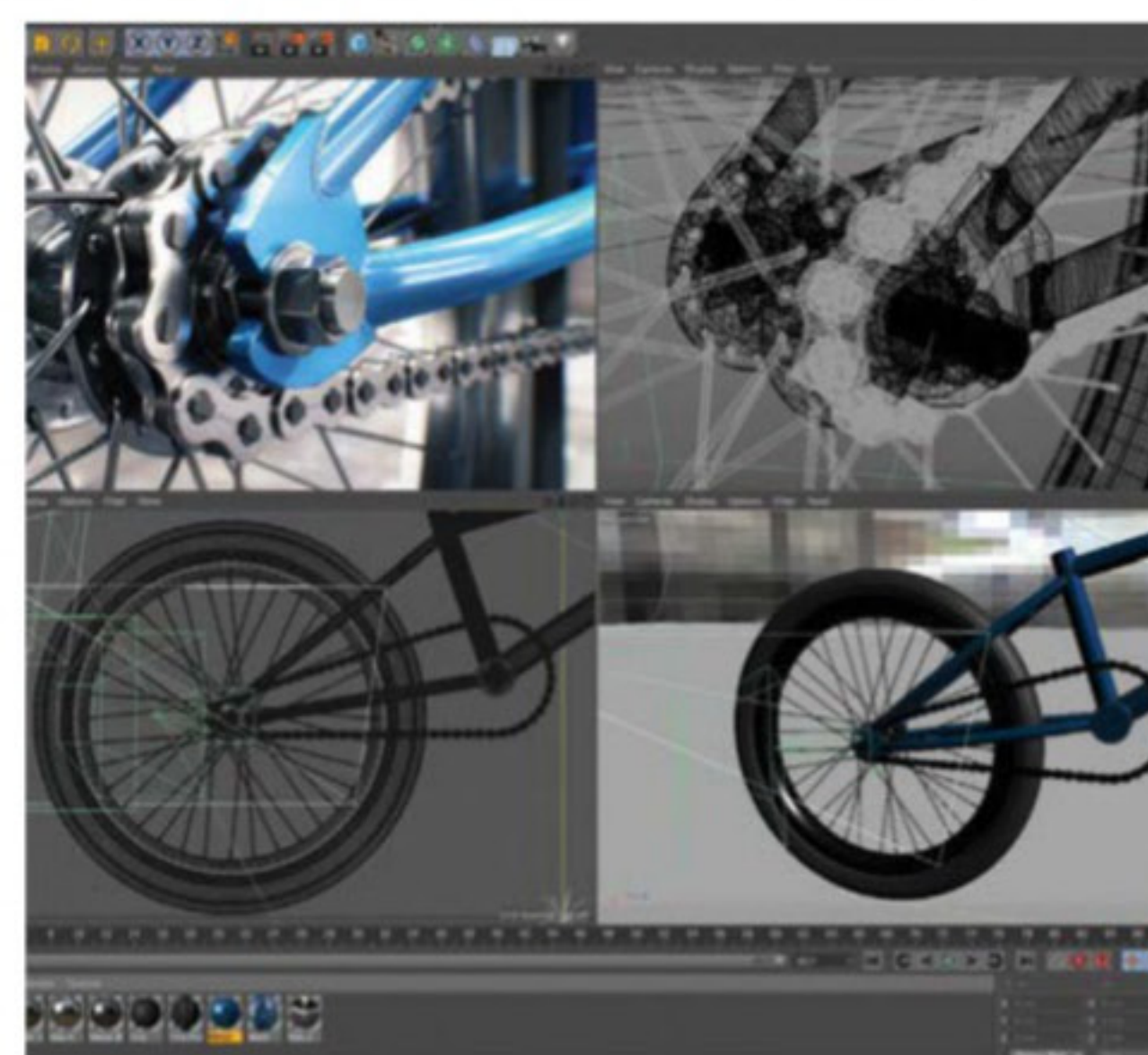
Exciting new features include plenty of modelling and sculpting tools, such as the PolyPen function, which replaces the Create Polygon tool of previous versions and enables users to model comfortably as well as retopologise complex meshes quickly and easily. With it, a Cinema 4D user will now also be able to move, clone, cut and weld the points, edges and polygons of 3D models as well as control subdivisions. With Auto Weld mode enabled, edges and points will be able to automatically snap to close polygons or edges, while the new procedural Bevel Deformer bevels both whole objects and user selections non-destructively.

Other enhancements include a new Reflectance channel, which enables users to create multi-layered materials and surfaces to add shine to scenes. There's also a new

material and object library, and a new motion tracker – a matchmoving system, enabling precise camera reconstruction when compositing 3D elements with live footage. It also has an Auto-Tracking mode to search for trackable points without user intervention, while a full solve command can run an automated solve of the footage by adding a Motion Tracker object and several Constraint tags, such as Mask and Camera Orientation.

"Today's 3D content-creation professionals rely on efficient tools to optimise productivity," said Harald Egel, co-founder and CEO of Maxon Computer. "Cinema 4D R16 is a landmark release that underscores Maxon's focus on delivering 3D designers the most uncompromising, robust and artist-friendly software solutions."

Cinema 4D R16 is available through Maxon at www.maxon.net. Any users that already have an active Maxon Service Agreement valid through 2 September 2014 will also be able to receive an automatic upgrade.



A new Reflectance channel in Cinema 4D R16 lets artists create complex, multi-layered materials, such as a lacquer effect

System requirements and pricing

Minimum CPU requirements for Cinema 4D R16 include an Intel Pentium 4 and Athlon 64 as a minimum for Windows, or an Intel Core 2 Solo for Mac. Operating systems supported include Windows 7 64-bit, 8 64-bit, and 8.164-bit, or OS X 7.5 and higher. Download a demo at www.maxon.net/en/products/demo-version/download-form.html or buy it from \$995 for Cinema 4D Prime, to \$3,695 for Cinema 4D Studio.

Hardware advances

The industry keeps pushing hardware capabilities

Nvidia has been very busy of late, having announced a new professional next generation of Quadro GPUs with the K5200, K4200, K2200, K620 and K420. These will enable users to interact with data sets and designs twice the size handled by previous generations, as well as run major applications, such as Adobe CC, 40 per cent faster. The company also unveiled its new VCA to speed up rendering to the point where frames that take over nine hours to render on a multi-core CPU take only 14 minutes.

Meanwhile, AMD announced its new generation of FirePro graphics cards with the W2100, W4100, W5100 and W7100, all of which are supported by the AMD Graphics Core Next architecture.

Dell also revealed a new lineup with its Precision Tower 5810, Precision Tower 7810, Precision Tower 7910 and Precision Rack 7910, which have been revamped to perform up to 4.5 times faster

than the previous generation and have double the memory capacity with 2133MHz DDR4 memory. Lenovo has announced a new ThinkStation P-Series with a new design for more thermal management and tool-free upgrading.



Dell has revealed a new lineup of hardware

The new ZBrush 4R7

Pixologic reveals the exciting new features of ZBrush 4R7

Pixologic chose not to attend SIGGRAPH this year, but instead hosted its own three-day event, the 2014 ZBrush summit, at the Gnomon Workshop. Along with presentations and discussions, the company gave a peek at the latest version of ZBrush. Rumoured to be released later this year, 4R7 will be the last upgrade to the ZBrush 4 series, as well as the final 32-bit version of the 3D modelling tool. Pixologic even announced it will be releasing a 64-bit public beta of ZBrush 4R7 on the same day.

A new partnership was revealed between Luxion and ZBrush that would result in a bridge between ZBrush and KeyShot to be able to send data between the two. The latest full version of KeyShot will then be designed exclusively to link to ZBrush through the bridge.



ZBrush 4R7 is set to include a host of new modelling tools, such as hard-surface features

NASA SEALS Kickstarter

DAVE School founder looks into animating features



To help fund the campaign for the independent film, visit www.kickstarter.com and search for the words NASA SEALS

In a bid to enable artists to create their own feature animations without the need for a hundred-strong team and years of time, DAVE School founder Jeff Scheetz and a team of graduates are exploring the boundaries between pre-vis imagery and deliverable animation through a new script, NASA SEALS.

Based on the story of NASA astronauts teaming up with Navy SEALs to rescue the survivors of an alien attack in the film *NASA Seals*, Scheetz is turning to Kickstarter to help fund the project. Throughout October, he will be hoping to raise \$55,000 to bring the school's independent project to life.

Software shorts

Bringing you the lowdown on product updates and launches

AniRef

Created by The Mill NY's Paolo Cogliati, AniRef is an app aimed at animators that lets you record, import and analyse video footage from any iOS or Android device. Features include track markers that can be placed on individual frames, slow-motion playback, and embedding capabilities to email yourself your tracked reference. www.aniref.com.



V-Ray 3.0 for Softimage



V-Ray 3.0 for Softimage is now available as a free update for all current users of V-Ray for Softimage. It includes new upgrades, such as faster feedback for artists with the Progressive Image Sampler and a new dedicated skin shader. For more information about the update, visit the V-Ray for Softimage product page at www.chaosgroup.com/en/2/vray_softimage.html.

The Foundry Colorway for Cinema 4D



Following the unveiling of Colorway in July, The Foundry has launched the kit for Maxon's Cinema 4D, giving users access to a clean, simple environment where they can develop the look and lighting for 3D objects and scenes before sharing a selection of iterations with clients in real-time, all without the need to render. See even more at www.thefoundry.co.uk/products/colorway.

Extensions and apps

Autodesk announces new Maya and Max extensions as Shotgun shows new tools



3ds Max's new Alembic support. Visit <http://area.autodesk.com/siggraph2014/press> for more info

Shotgun Software, which was recently bought by Autodesk, announced its first new releases since the acquisition. This includes a mobile app,

which will enable supervisors to keep updated on their projects and feedback on work to artists.

The second, the new Shotgun Desktop, will enable artists to have a single interface to launch software from. Shotgun also announced it will now be integrated with The Foundry's MARI 3D painting software.

Meanwhile, parent company Autodesk has unveiled Flame 2015 Extension 2, which includes support for Shotgun Software, as well as made extensions for both 3ds Max 2015 and Maya 2015 immediately available.

Project Focus

The Book Of Life

Reel FX's latest animated film brings to life the vibrant world of Mexican folklore, from director Jorge Gutierrez and producer Guillermo del Toro

REEL FX

Project *The Book Of Life*

Description An animated feature film from director Jorge Gutierrez and producer Guillermo del Toro, wherein a young man, Manolo, is torn between pursuing his love and fulfilling the expectations of his family. Things don't go to plan, and Manolo must embark on a trip through three fantastical worlds

Country USA

Bio Reel FX is a design, visual effects, animation and entertainment studio based in the USA. Its feature film credits include *Cirque du Soleil: Worlds Away* and *Free Birds*, and has been the recipient of numerous awards and multiple Academy Award nominations for its short film work

Website

www.reelfx.com

I first came up with the idea for *The Book Of Life* when I was in film school at CalArts," director **Jorge Gutierrez** tells **3D Artist**. "Having grown up in Mexico, I was always surrounded by all this beautiful artwork and I played with American toys and Mexican folklore toys. When it came to my thesis film, I directed a CG-animated short that was very much inspired by my upbringing and the Day of the Dead festival. It was a bunch of wooden-puppet characters created in a computer."

Animation has had a long and successful history for bringing inanimate wooden toys to life, from the early days of *Puppetoons* and *Pinocchio*, right up to Pixar's *Toy Story* movies. For a young Jorge Gutierrez, the young animator wanted to bring a Mexican twist to the tradition. A few years after directing the short in 1997, Gutierrez was convinced to adapt the film into a feature-length movie.

"I went into a bookstore and bought *How To Write A Movie In 21 Days*," he laughs. "I went home and started writing and I pitched the movie to every studio in town. They told me there wasn't an audience for this." Several years had passed before US animation studio Reel FX approached Gutierrez, looking for him to helm a unique animated movie. *The Book Of Life* had found a home.

The story is of two childhood friends, Manolo and Joaquin, both fighting for the affections of beautiful Maria, while the gods watch over and wager on who will win her heart. Afraid to lose the bet, spirit Xibalba sends a snake to kill Manolo, which sends Manolo on a journey through three fantastical worlds

“By the time a character reached the animator... it was this weird thing that they weren't used to”

Jorge Gutierrez, director

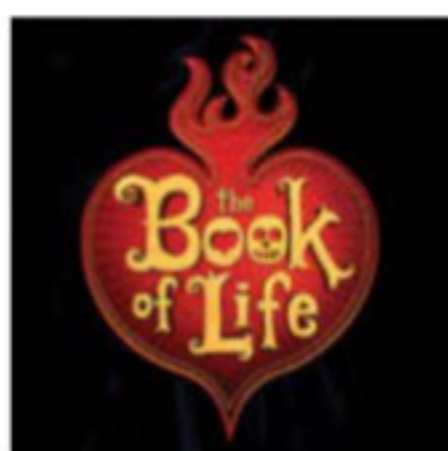


to return to his love. Inspired by Mexico's famous Day of the Dead festival, transposing the colour and liveliness of the holiday's festivities into the film's environments and characters was key to establishing the visual language.

"I love animated movies and I collect 'art of...' books and I would always fall in love with the artwork, but then I'd see what happens to the films and it looks like stuff had been watered down," says Gutierrez. "I started talking to directors and art directors to figure out what happened. I found out that, for example, in character design you design something and turn it in and it'll go through so many other departments.

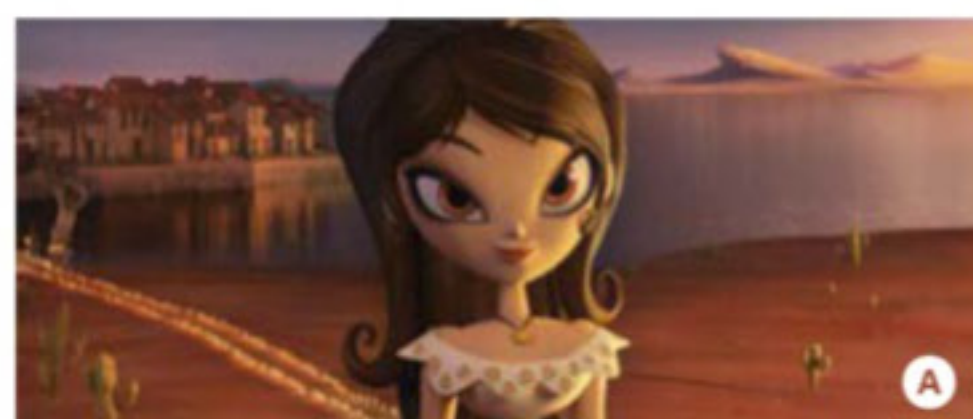
"When something is so hard to make, each department wants to make their lives a little bit easier," continues Gutierrez. "So the character will get longer legs, then the modelling guys will say 'Well, instead of having 600 skulls on him, can he have five?', and then texturing department will do their thing, then the rigging department. By the time you've dealt with their requests, you've got a watered-down

Contributors



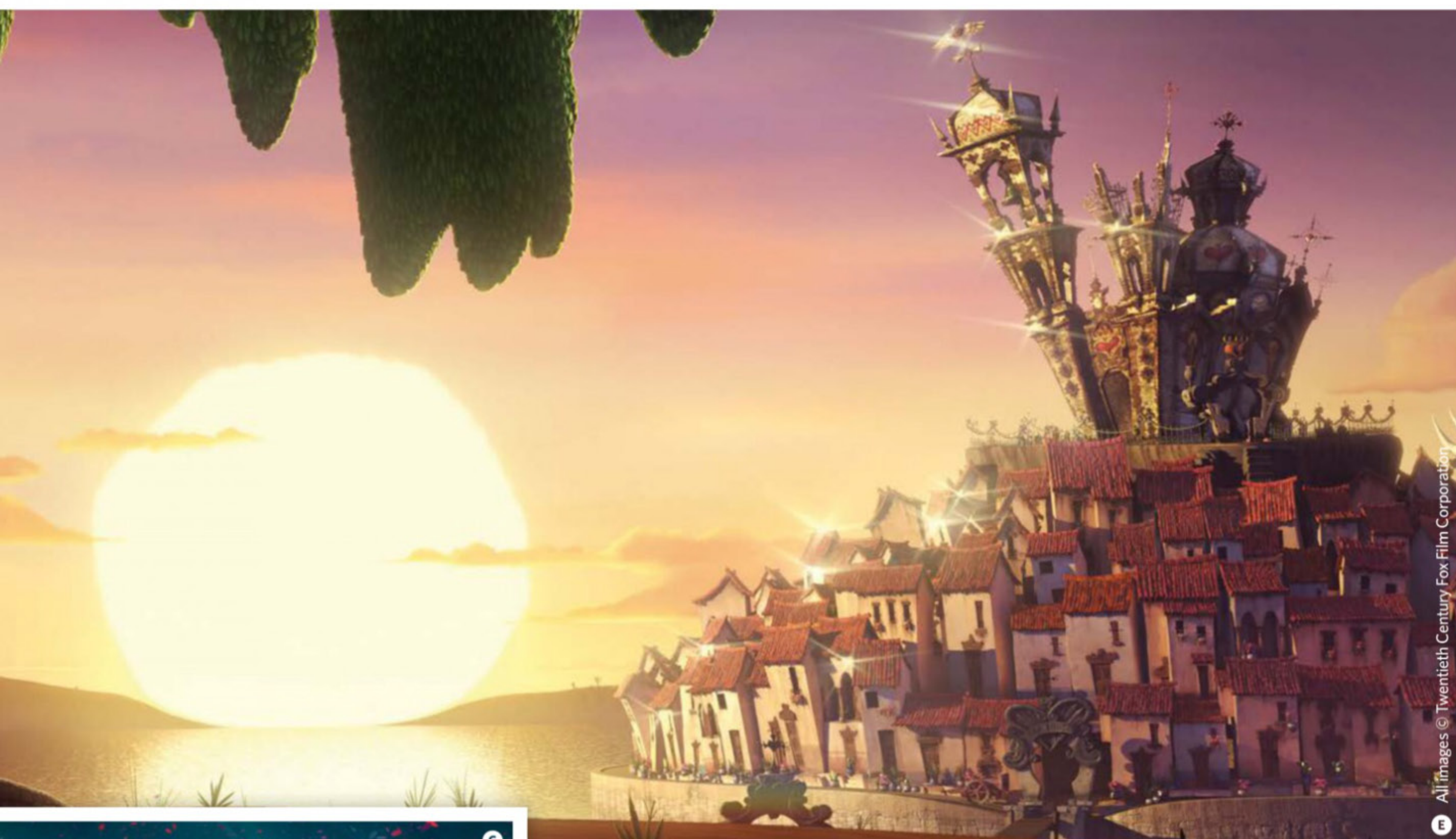
Jorge Gutierrez
Director

Augusto Schillaci
Visual effects supervisor



A *The Book Of Life* was based on a 3D animated short film that director Jorge Gutierrez created as a student. He started working on an feature film adaptation back in 2000, and Reel FX approached him about making a unique animated feature years later





All images © Twentieth Century Fox Film Corporation



Collaborating with Guillermo del Toro

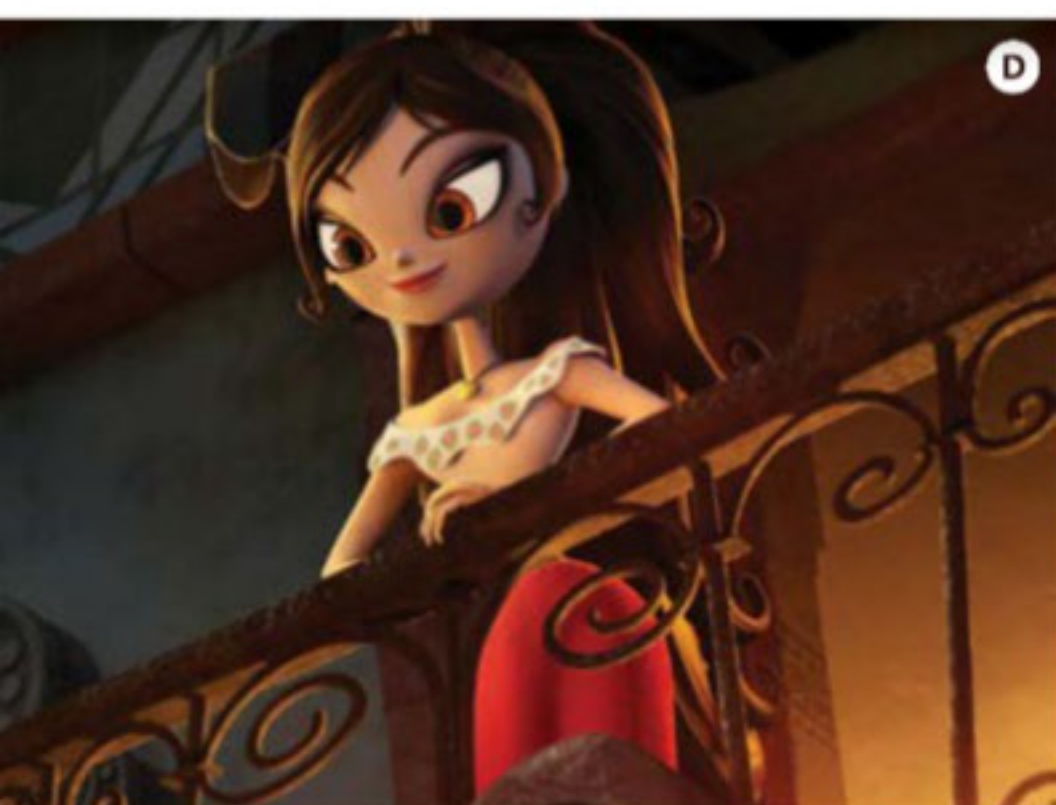
Director Jorge Gutierrez explains how the creative partnership with Mexico's most famous filmmaker became a reality

"They asked who the dream producer would be to help make this vision a reality," says Jorge Gutierrez. "Well, like all young filmmakers from Mexico it has got to be Guillermo del Toro! Cut to two months later and I was pitching him the film and he fell in love with the movie. He's used to massive movies, so I would show him a sequence that was quite modest compared to \$100 million movies. I was trying to impress him – I'd feel like a little brother. He kind of really got into the creative risks we were able to take that he can't on giant blockbusters."

version of your original design. On this film my approach to all those departments was 'We're all in this together, but we're not going to make any changes to this design or this world to make things easier'. In the beginning there was a lot of hesitation, but slowly we started cooking together and sure enough all these limitations became our strengths."

The film presented a unique challenge to Reel FX on many fronts, but in particular bringing to life the cast of wooden puppets. "Our film started looking very different," says Gutierrez. "By the time a character reached the animator – where the legs were tiny and the eyes were huge – it was this weird thing that they weren't used to. When it came to animating it they couldn't rely on their usual tricks. We had to figure out new ways to communicate our story with these strange designs. Our team excelled at that because there was no history to it, they were creating it as they went along."

Visual effects supervisor, Augusto Schillaci, agrees, highlighting how lighting a cast of cube-shaped characters prompted the department to think outside



B The movie attracted the vocal talents of numerous well-known and renowned Hollywood stars. Channing Tatum, Zoe Saldana and Christina Applegate all star in the film, alongside the Mexican actor Diego Luna, who plays Manolo

C With all the characters in the film made from wood, the difficulty for the studio was to make sure that each would have enough movement to expressively emote and gesture. Deforming the grain and adding layers emphasised this effect

D "I pitched the movie to every studio in town. They told me there wasn't an audience for this," states director Jorge Gutierrez, remarking that his unique vision and characteristic style wasn't something that appealed to larger studios

E Reel FX primarily used Houdini in the making of the film. This came in particularly handy when it came to the unique textures and design of the world and its distinctive characters, enabling the artists to create custom tools to tackle fresh challenges

the box. "The [cuboid] characters made it a huge challenge to accommodate the lighting," he says. "For example, if someone wants to make a rim light for a cube, that's very hard because it either hits one or the other face. So we had to create levels on the face, work out some custom lighting that goes with the characters at all times to be sure to get that specific rim light that we wanted to do. Also the characters have a lot of metals and gold, so we had to have custom light just hitting the gold and metal all the time to be sure they look nice and shiny."

"Lighting was how I got into the industry and it's still my passion," adds Schillaci. "There's a huge amount of colours and different kinds of light through the film and it makes every sequence unique. We had to invent different techniques and ideas that enabled us to create this big world. Our software of choice for this movie was Houdini, and it was a huge advantage because it enabled us to create a lot of custom tools to have full customisation of the props and tools we were using."

Having that flexibility in the artist's toolset was crucial in maintaining a consistent art direction, especially when the story transports viewers on a journey across three fantastical worlds – The Land of the Forgotten, The Land of the Remembered and The Land of the Living. For the moment that the film's hero Manolo awakens in The Land of the Remembered, the sheer scale of the shot would take the team over two months to complete. "It was so vast, so gigantic and colourful that it was a creative challenge to be able to spread that world into three dimensions," remembers Schillaci. "We couldn't cut corners. We had to be very creative. The biggest challenge was creating a city with people, plants and different structures, because we had to create that, render in time and be manageable for the artists. When you're making it in stereo you can't cheat. Not as much as we could do with matte paintings or stuff like that for non-stereo versions. Everything has to be three dimensions, and that was a huge challenge because it was a floating city with no bottom."

However, Gutierrez considers the creation of each of the worlds an equally arduous task. "I wanted all three of the worlds to be completely different and



unique, but loads of fun," he enthuses. "The Land of the Forgotten is a lack of colour and all sharp shapes; The Land of the Remembered is all round and all beautiful – almost like a living velvet painting; The Land of the Living is a very traditional Mexican town with a Spaghetti Western feel. Each is created to be so distinctive that when the movie cuts to one of these worlds, the audience knows exactly where they are. It's like having three different delicious dishes that we constantly mix up so you're always going to be happy." His favourite? "The Land of Remembered," he concludes. "That's the main dish of the film."

The Book Of Life is due to be released in the UK on 24 October 2014. For more information, visit the film's official website at www.bookoflifemovie.com.

Playing with fire

Visual effects supervisor Augusto Schillaci discusses the challenge of implementing realistic physics in a stylised world

One of the most important aspects of building a tangible fantasy world is consistency across its entire art direction. This can be particularly tricky when implementing realistic physics, as visual effects supervisor, Augusto Schillaci, discusses. "I think the effects challenges were very unique," he says. "I'm talking about water, fire and smoke. When you get to physics, it's very hard to art direct them. It's one of the things where art direction and physics don't really go together – but where we're making a very stylised movie, we didn't want to create this weird contrast with really realistic effects, and software tends to do that. It was a challenge to integrate rain, fire, water without affecting the look of the movie."

"I wanted all three of the worlds to be completely different and unique, but loads of fun"

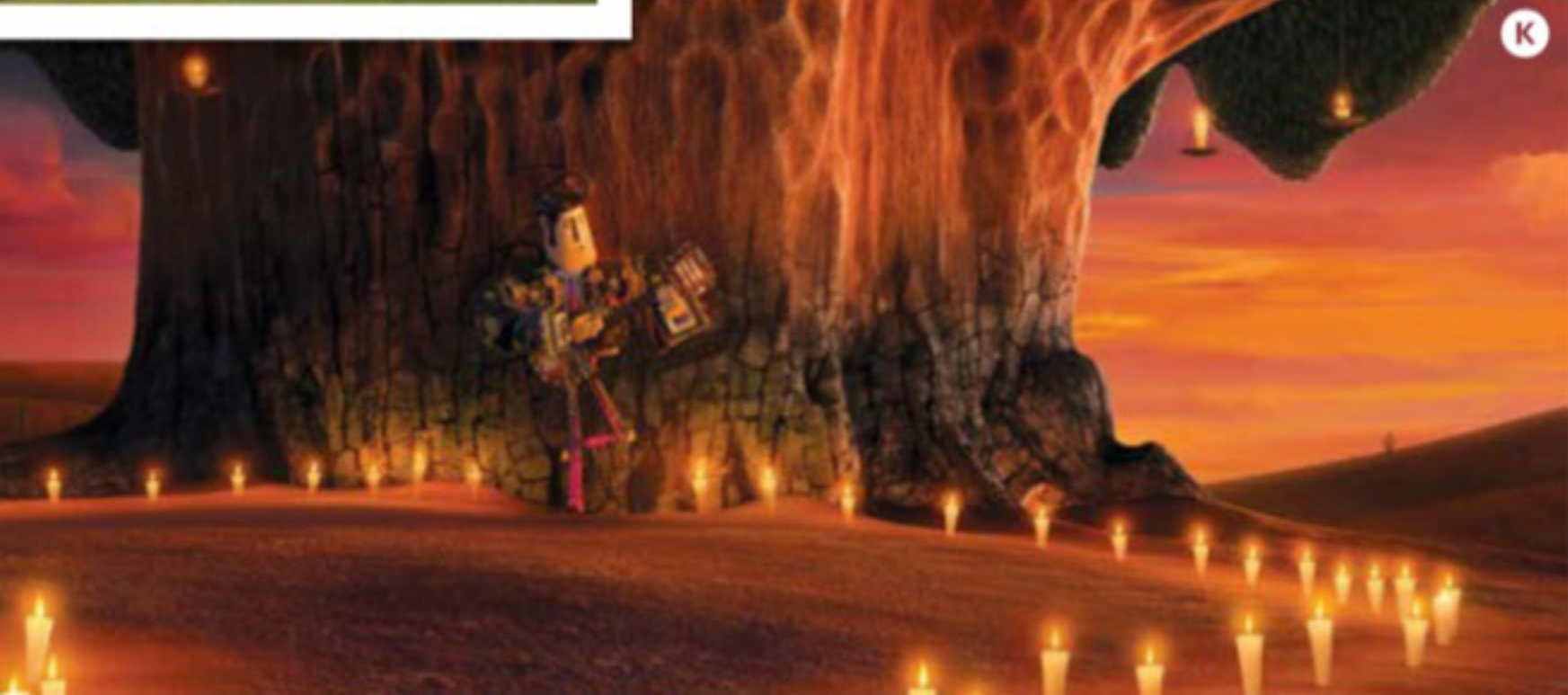
Jorge Gutierrez, director



F The film channelled many traditional Mexican customs and folklores. In particular, the film plays on the Mexican Day of the Dead festival, which celebrates and commemorates those friends and family members that have passed away

G Studio Reel FX is not only known for its animated feature and short films, but it also provides a wide variety of visual effects services for live-action films, commercials and even theme park rides. Visit Reel FX's website at www.reelfx.com

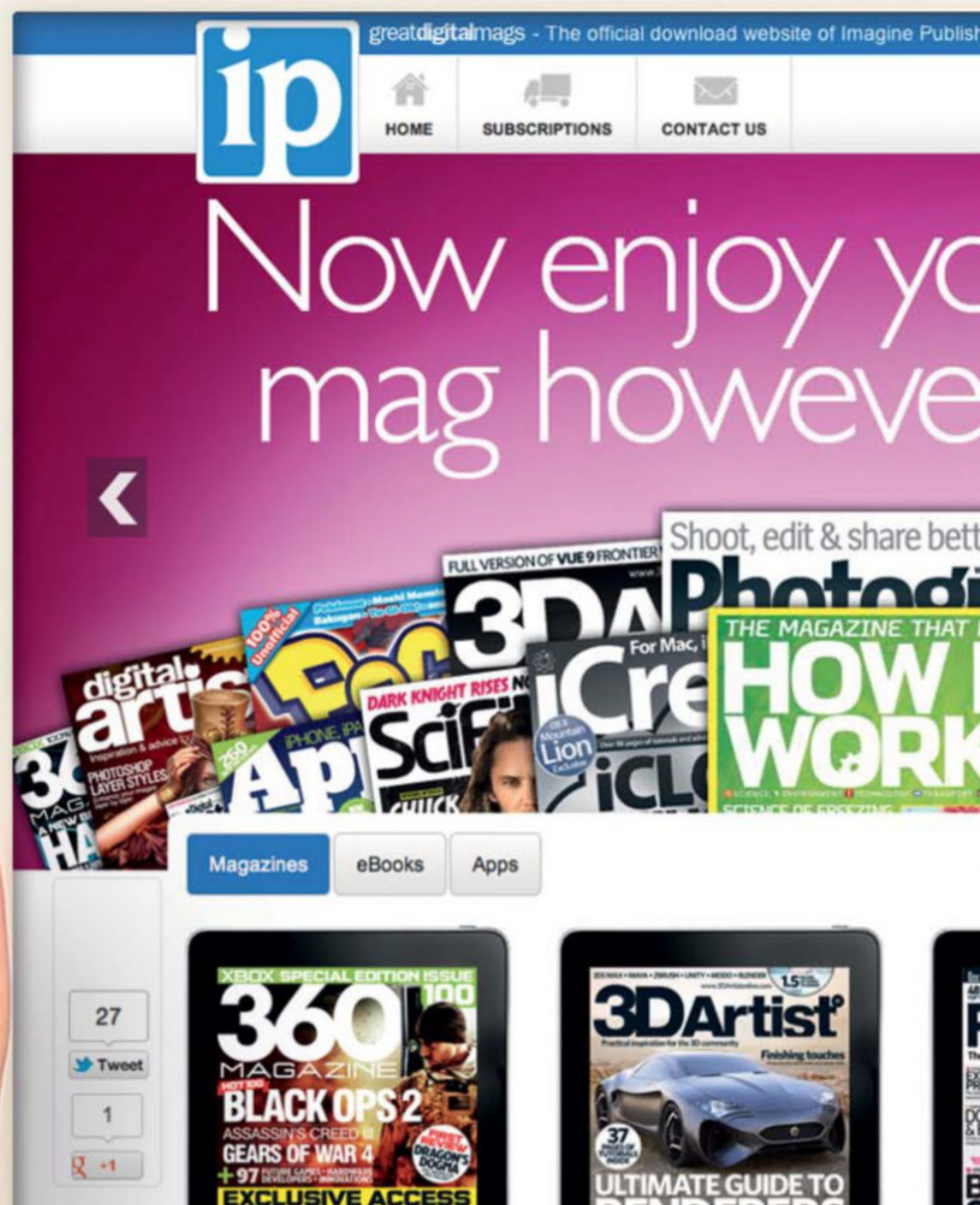
H The headquarters of Reel FX is based in Dallas, Texas, USA, but it also has an office in Santa Monica, California. In 2013, Reel FX won an Annie award for its short animation, *Despicable Me: Minion Mayhem*



I One of the biggest challenges that the team faced was effectively lighting the characters, as their cube-shaped heads meant that the lighting would hit only one face of the cube, leaving the remaining faces of the shape in shade

J Each of the three worlds in the movie are given a distinct visual flavour, meaning that the film is constantly giving the audience an enticing and spectacular new visual palette on a regular basis, while making it clear which world the viewer is seeing

K The physics in the movie posed a challenge for the studio, with fire, water and smoke in various scenes demanding realistic properties. As well as this, it was imperative that it remain in-tone with the film's unique visual style



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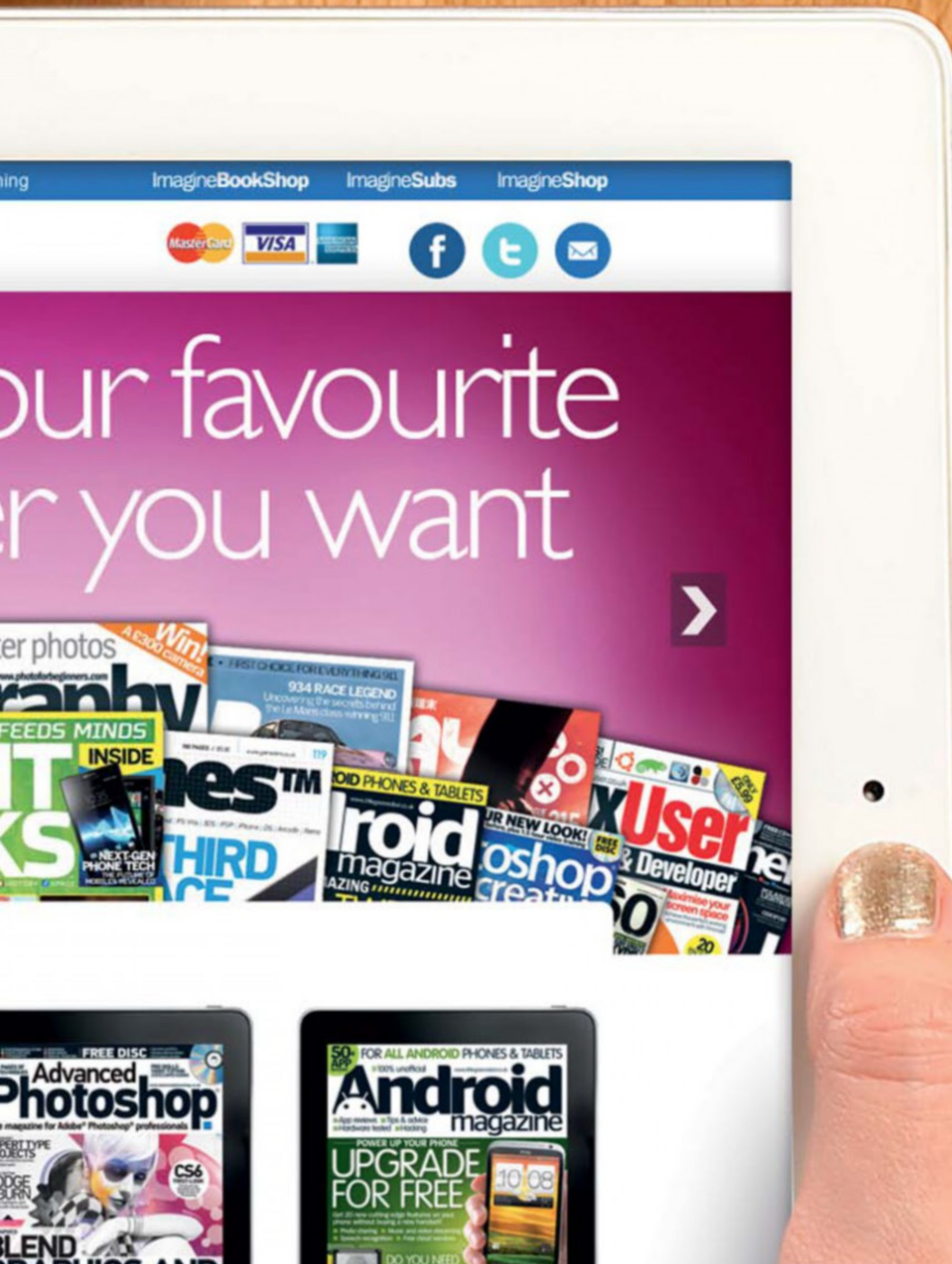
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